Annual Report Saskatchewan Environment 1982-83

Neal Hardy
Minister

Alan Carr
Deputy Minister

Open Jack pine forest. Photo by Henry Epp

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Neal Hardy, Minister of Environment

His Honour
Frederick W. Johnson
Lieutenant Governor
Province of Saskatchewan
511 A Hotel Saskatchewan
Regina, Saskatchewan
S4P 0S3

Dear Sir:

I have the honour to transmit the annual report of Saskatchewan Environment for the period commencing April 1, 1982 and ending March 31, 1983.

Yours sincerely,

Neal Hardy
Minister

Hon. Neal Hardy
Minister
Saskatchewan Environment

Dear Mr. Hardy:

I have the honour to submit the annual report for Saskatchewan Environment for the year ending March 31, 1983.

During the report year, department programs and policies were closely evaluated in view of new government objectives and policies. This resulted in major changes in organization and program delivery to improve administration of acts and regulations and streamlining approval processes.

Development continued on a long-term strategy for hazardous waste management in the province. A major symposium held in Saskatoon in April brought to light the views of industry, transportation and research organizations as well as various levels of government on the direction of waste management planning. Amendments to The Department of the Environment Act were prepared to address the hazardous waste management issue. Under the new legislation, authority would be provided to regulate the generation, storage, transport, treatment and disposal of hazardous wastes as one management system.

Plans to establish pesticide container collection and disposal sites throughout the province by the 1983 spraying season were initiated. The voluntary program will involve the collection, crushing and disposal of residue from approximately one million chemical containers discarded by farmers each year. This plan will be initiated as a joint venture with rural municipalities.

Two major studies completed during the fiscal year will provide part of the data base to develop waste management programs. These were an inventory of chemical waste presently generated in the province and the assessment of potential environmental and health implications of active and abandoned landfill sites.

The need for a provincial water management strategy was highlighted by the establishment of the Cabinet Committee on Water Concerns. The main focus of the committee was to identify existing and emerging water and wastewater issues. The department provided technical staff, financial resources and inquiry assistance to the committee during public hearings held in ten provincial centres February 21 to March 3. More than 200 briefs expressing agricultural, industrial, recreational, environmental or municipal concerns were presented by groups and individuals.

Alan Carr
Deputy Minister of Environment

To further assist with drainage related problems, a drainage appeal board was established in November to hear appeals on decisions made by the department on complaints and permits.

Planning was initiated on a new anti-litter public involvement program to be held in early June as part of Saskatchewan's contribution to Canadian Environment Week. The objective of the program is to increase the individual's awareness of litter and litter prevention by stimulating public participation in community cleanup activities.

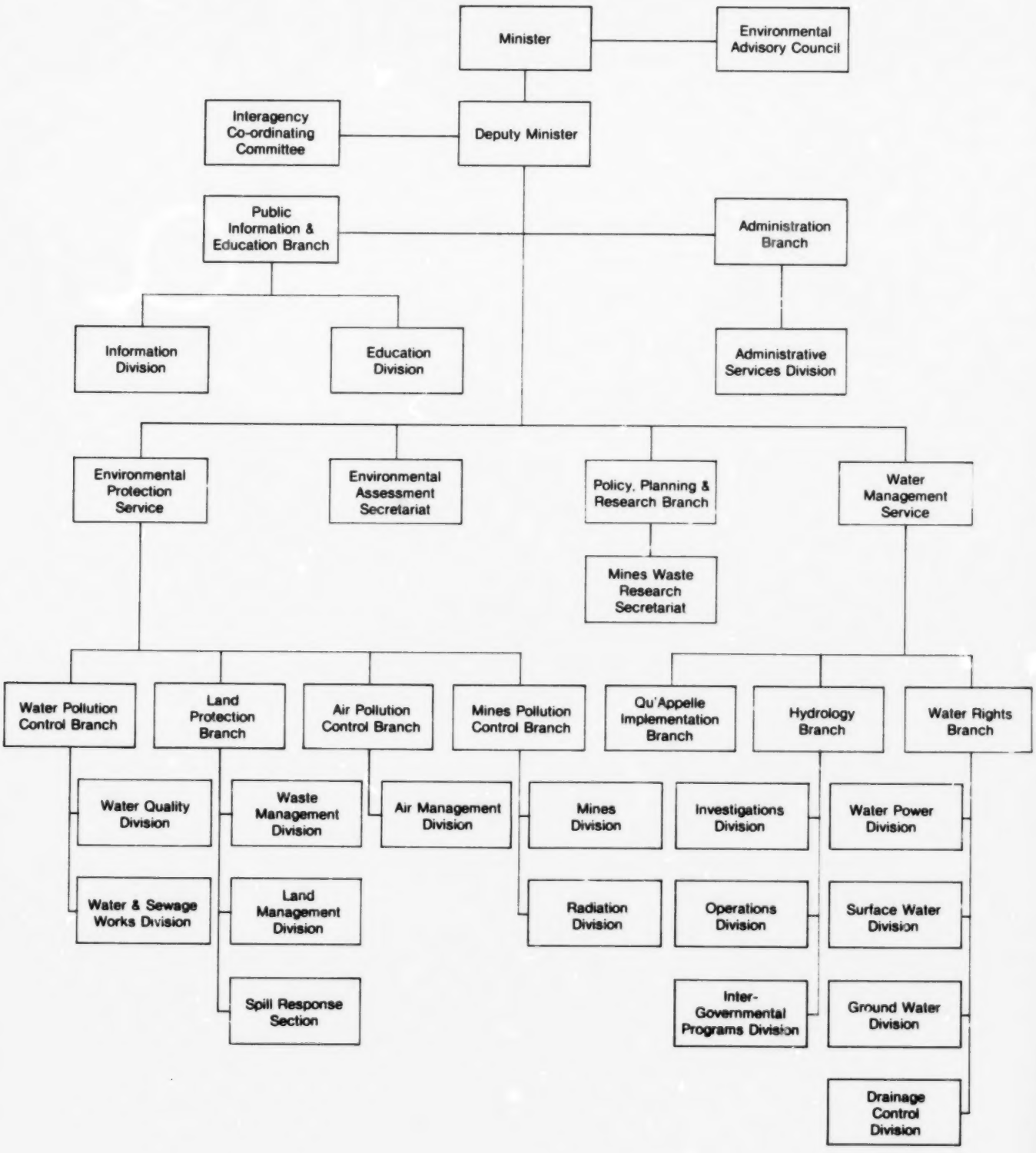
Considerable credit must be given to department staff for their dedication in fulfilling the department's mandate to protect and preserve the environment.

Also, credit must be given to the many public and private agencies that provided co-operation and assistance to the department throughout the fiscal year.

Yours sincerely,

Alan Carr
Deputy Minister

Organization Chart



Environmental Protection Service

G. W. Howard, Executive Director

L. J. Lechner, Director
Air Pollution Control Branch

D. A. Fast, Acting Director
Water Pollution Control Branch

A. Dimitrijevic, Acting Director
Land Protection Branch

R. R. Sentis, Director
Mines Pollution Control Branch

Environmental Protection Service

Introduction

Protection of Saskatchewan's environment is a complex task and is the responsibility of all levels of government, industry and the public. Through four branches, the environmental protection service has the responsibility of:

- establishing environmental quality objectives;
- establishing emission or ambient standards;
- licensing treatment and pollution control works;
- monitoring emissions and their impact;
- enforcing standards;
- requiring improvements where necessary.

Legislation

The department is authorized to carry out the above responsibilities under The Department of the Environment Act, The Air Pollution Control Act, The Water Resources Management Act and The Litter Control Act.

Interagency Activities

The department works with several other departments to ensure the protection of the province's environment. Some examples include:

- Saskatchewan Agriculture regulates intensive livestock operations;
- Saskatchewan Mineral Resources regulates oil and gas development;
- Saskatchewan Health regulates landfill sites and cottage wastes and provides laboratory services. Public health inspectors inspect water and sewage treatment facilities and report their findings to Saskatchewan Environment for any required follow-up;
- Saskatchewan Urban Affairs provides grants for water and sewage works;
- Officers of Saskatchewan Parks and Renewable Resources make extensive use of The Litter Control Act.

Other Controls

The owner or operator of pollution control or water works is required to carry out monitoring programs and report findings to Saskatchewan Environment. Licences to operate pollution control works are issued for a fixed term of up to five years. This procedure enables a periodic review of the terms and conditions in the licence before the licence can be renewed.

Co-ordination

To ensure that a co-ordinated approach to environmental pollution concerns is maintained, the service holds regular meetings of its four branches. In addition, there is extensive contact with municipal governments, federal government agencies and provincial agencies.

An example of a coordinated approach to environmental protection is found at the Poplar River power project. The executive director represents the province on the Poplar River Bilateral Committee with technical support from the air pollution, water pollution and mines pollution control branches, plus the hydrology and water rights branches of the Water Management Service.

Air Pollution Control Branch

- maintains a network of ambient air monitoring stations in urban centres;
- issues operating permits to industrial operations which meet air pollution control standards;
- investigates air pollution complaints;
- conducts special studies on suspected problem areas;
- provides technical assistance and information on request;
- drafts guidelines to assist applicants in obtaining permits to operate;
- reviews development proposals and environmental impact studies for the Environmental Assessment Secretariat.

Air Management Division

Urban Air Monitoring Program

The provincial Urban Air Monitoring Program operated in all 12 Saskatchewan cities during the fiscal year. Twenty-six monitors were used to record data in this network. The addition of an oxides of nitrogen monitor and an ozone monitor in Saskatoon were the only changes to the program. Table 1 indicates the types of monitors installed at each station.

Fifteen high volume air samplers collected data on suspended particulate levels in Saskatchewan. The results obtained over the past 11 years indicate that particulate levels are generally decreasing or remaining constant. The annual provincial standard of 70 micrograms per cubic metre was exceeded in Swift Current in 1982 primarily as a result of high spring winds and dust from agricultural areas.

Four sulphur dioxide monitors collected data as part of the National Air Pollution Surveillance (NAPS) program in Saskatchewan. Sulphur dioxide levels in the major cities are very low. The provincial one hour standard of 17 parts per hundred million (450 micrograms per cubic metre) was not exceeded at any of the urban monitoring locations.

Table 1 Urban Air Monitors in Saskatchewan Cities

	Present	Proposed
Regina	3 high volume samplers 1 sulphur dioxide monitor 1 carbon monoxide monitor 1 oxides of nitrogen monitor 1 ozone monitor	1 hydrocarbon monitor
Saskatoon	2 high volume samplers 1 sulphur dioxide monitor 1 carbon monoxide monitor 1 oxides of nitrogen monitor* 1 ozone monitor*	
Moose Jaw	1 high volume sampler 1 sulphur dioxide monitor	
Prince Albert	1 high volume sampler 1 sulphur dioxide monitor	
Lloydminster*	1 high volume sampler 1 sulphur dioxide monitor	
Estevan*	1 high volume sampler	1 sulphur dioxide monitor
Swift Current*	1 high volume sampler	
North Battleford*	1 high volume sampler	
Yorkton*	1 high volume sampler	
Weyburn*	1 high volume sampler	
Melville*	1 high volume sampler	
Melfort*	1 high volume sampler	

* Provincial monitor — other monitors supplied by Environment Canada

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Weyburn*	1 high volume sampler	
Melville*	1 high volume sampler	
Melfort*	1 high volume sampler	

* Provincial monitor — other monitors supplied by Environment Canada

In Saskatoon during 1982, the provincial one-hour standard for carbon monoxide of 13 parts per million (15 milligrams per cubic metre) was exceeded five times. The eight hour standard of five parts per million (six milligrams per cubic metre) was exceeded 23 times. In Regina, the one hour standard was exceeded 33 times and the eight hour standard was exceeded 95 times. The majority of these high readings occurred during January. Automobile traffic is thought to be the major contributor to these high readings.

An air quality index which summarizes annual montoring results was calculated for Regina based on the available data. Individual indices were determined for ozone, suspended particulates and carbon monoxide. These were averaged to give an over-all annual index of 33 which means that the air quality in downtown Regina during 1982 can be described as fair. The suspended particulates made the largest contribution to the index. This is primarily caused when increased dust conditions result after spring thaw or from farming operations.

Reports summarizing the provincial air monitoring program are published annually and are available on request from Saskatchewan Environment. Proposed program expansions next year include sulphur dioxide monitoring in Estevan and hydrocarbon monitoring in Regina.

In addition to the NAPS program, the branch operated a mobile air quality station, monitored air quality in the vicinity of various industrial operations and required licenced operations to carry out air monitoring as an operation permit condition on a number of approvals.

Permit System

The Air Pollution Control Regulations, which became effective in 1975, outline the provincial air quality standards and the requirements for an industrial permit system. New industrial sources of air pollution require permits from the branch. Existing operations do not require permits unless requested by the minister of environment or unless a significant expansion program is undertaken.

During the fiscal year 59 new permits were issued and 216 permits were renewed. (It is anticipated that based on past experience approximately 50 new permits will be issued in the next fiscal year.) Table 2 lists the various types of industries that have been issued permits to operate.

Table 2 — Classification of Permits

	New	Renewal
Anhydrous ammonia storage facilities	19	71
Asphalt plants	1	42
Grain elevators	23	42
Seed cleaning plants	2	8
Incinerators	3	5
Concrete batching plants	1	6
Oil refineries	--	1
Steel mills	—	1
Iron foundaries	2	1
Thermal generating station	—	1
Hard chrome plants	—	2
Chloralkali plant	—	1
Post treatment plants	1	2
Oil gathering and treating facilities	—	4
Pilot plants	—	3
Wood products	—	4
Charcoal briquetting plants	—	2
Miscellaneous industries	7	20
Total	59	216

Table 3 — Industrial Permit System

Total permits issued to year end	330
New permit applications approved	59
Existing permits renewed	216
Permit applications not approved	0

Industrial Monitoring Activities

Avonlea Mineral Industries Limited, Wilcox

Complaints concerning dust emissions from the plant were received during the previous fiscal year from residents of Wilcox. The branch operated a high volume sampler in the town during 1982 to measure the concentration of suspended particulate matter in the air. Monitoring results were typical of a small town in an agricultural area. There were no violations of provincial air quality standards recorded. The company was asked to monitor suspended particulate levels and dustfall near the plant. The branch set up a dustfall monitoring program in the town and near the plant.

Federated Co-operatives Limited, Regina

The company completed work on a new coker which allows heavy residual oils containing appreciable amounts of sulphur to be processed into coke rather than burned in process furnaces and heaters. In addition, a sulphur recovery plant to sweeten refinery gases for use as fuel in the plant was under construction. Odor complaints continued to be received from local residents. The company plans to improve its waste water lagoon system to reduce unpleasant emissions. One of the company's air monitoring stations was moved closer to the nearest residential area to obtain a more accurate measurement of the impact on air quality that refinery operations have in that area. Improved hydrogen sulphide monitors were ordered by the company and are expected to be installed early in the next fiscal year.

Pasqua Paving Limited, Regina

The company operated on a limited basis during 1982 without a permit from the branch. Discussions continued with the company regarding improvements to the operations and a permit renewal for 1983.

Interprovincial Steel and Pipe Corporation (IPSCO), Regina

The branch's program to monitor suspended particulate levels around the plant was concluded during the fiscal year. IPSCO continued its ambient suspended particulate monitoring program and the department continued to operate a high volume monitor in Uplands. Particulate levels in the industrial area remain fairly high, however, in Uplands the results compare to those for commercial areas in the city.

IPSCO did not experience any major operational problems with the air pollution control equipment installed on furnace five during the fiscal year.

Poplar River Power Station, Coronach

The Saskatchewan Power Corporation conducted ambient monitoring for suspended particulates and sulphur dioxide near the plant. In addition, the branch monitored for sulphur dioxide and suspended particulates in the Town of Coronach. Monitoring results showed that the plant had a small impact on the levels of these pollutants in the area. Air monitoring data was exchanged with U.S. authorities.

Murphy Oil Limited, Eyehill Thermal Project

A number of complaints were received during the fiscal year concerning hydrogen sulphide odors near the plant which is located north of Macklin. Frequent deviations from the provincial ambient hydrogen sulphide guidelines were recorded in the area. The company was required to obtain an incinerator to burn all gases containing hydrogen sulphide early in 1983. The unit was installed and appears to have solved the odor problem, except during unusual or upset conditions.

Ambient monitoring for hydrogen sulphide and sulphur dioxide on the part of the branch and the company will continue in the next fiscal year.

Complaint Investigation

Forty-two air pollution and noise complaints were received during the fiscal year. In general, the complaints centered on dust and odors from operations such as asphalt plants, oil refineries, grain elevators and construction projects. In a number of cases small changes to the operation, additional precautions, or changes to operating procedures were or would be sufficient to satisfy the complaint. On the whole, Saskatchewan industries and citizens co-operate with department requests to eliminate causes of air pollution complaints. Of the 42 complaints, seven were resolved during the year, nine do not require further action by the branch and 22 are still under investigation.

Special Studies

Regina Airborne Lead Study

This investigation was completed in 1981. Results show lead concentrations below two micrograms per cubic meter which is typical of many Canadian cities. A preliminary summary of the data has been prepared.

Regina Ozone Study

Ambient monitoring of ozone in downtown Regina has shown frequent violations of provincial air quality standards over the past several years. It is believed that substantial background concentrations contribute significantly to levels recorded in Regina. These levels are typical of concentrations found in other Canadian cities. A study to determine naturally occurring background levels of ozone just outside the city was conducted during the latter part of the fiscal year. Information obtained was limited due to equipment problems, but it did indicate that rural ozone levels are somewhat lower than urban levels.

Ambient Monitoring — Heavy Oil Projects

The branch's mobile air quality station was located near Murphy Oil's Eyehill Thermal Project north of Macklin. The station has been gathering site specific ambient air quality data at a number of locations for the past three years. This program should be completed by June, 1983.

Conservacheck

The branch participated in the Conservacheck '82 vehicle safety and emission test lane which was held during the summer. At the branch's request, Environment Canada technicians made adjustments to 70 per cent of the 647 vehicles which were tested in Regina and Saskatoon. It is estimated that this resulted in a two to five per cent fuel economy increase depending upon the driving cycle. The emission test and adjustment portions of the program generated considerable interest and were very favorably accepted.

Acid Rain

Saskatchewan Environment is a member of the Long Range Transport of Atmospheric Pollutants Technical Committee which plans and co-ordinates acid deposition research and monitoring programs for western Canada. An annual report outlining the acid rain activities in western Canada during 1982 will be available in the next fiscal year.

A snowpack chemistry study of small lakes in northern Saskatchewan was conducted in January and March, 1982. The report, released in February, concluded that levels of sulphate and nitrate in the snowpack were very low and likely represents natural background levels. The deposition of sulphate and nitrate was quite uniform over the study area. Another survey was conducted in March to collect snowpack and lake water samples from the same sites as the previous study. The results of this survey will be available in the next fiscal year.

A rainfall sampling program was initiated in northern Saskatchewan during the summer. Samples of each rain event were collected at four sites. The levels of sulphate and nitrate in the rain were similar to those found in the snowpack. Further monitoring will be carried out in 1983.

A 1981 emissions inventory of sulphur dioxide and nitrogen oxides was prepared. The inventory examined ten major categories including industrial point sources, transportation, fuel consumption and forest fires. The inventory indicates sulphur dioxide emissions ranged between 63 000 and 77 000 tonnes and nitrogen oxides emissions ranged between 191 000 and 258 000 tonnes. Saskatchewan's emissions are considerably lower than those of neighboring provinces.

The inventory is used to determine environmental impacts of existing and future developments in acid rain sensitive areas and to develop a regional control strategy.

In 1980, the department, in co-operation with Alberta Environment and Environment Canada, launched a study into the potential for acid rain in northern Saskatchewan and northeastern Alberta. The report, released in July, concluded that the Precambrian Shield area is highly sensitive to acid rain, however, there is no evidence of environmental damage at the present time.

In March the four western provincial environment ministers agreed to develop a regional approach to control acid rain in western Canada. A task force of senior officals was established to recommend a strategy option. Work on a draft strategy is at a preliminary stage.

Regulations

Potash Emission Regulations

The Potash Refining Air Emissions Regulations were passed by Order-in-Council in January. The regulations limit salt dust emissions from drying processes to 0.57 grams per dry standard cubic metre. Enforcement of these limits for existing potash refineries begins January 1, 1985. New plants are required to meet the limits when operations begin. The regulations also outline emission testing and reporting requirements.

Air Pollution Control Regulations

A review of The Air Pollution Control Regulations were undertaken and a number of areas requiring updating and modification were indentified. Additional ambient air quality standards will be proposed and changes to the permit system which would bring major existing industries under the approval process will be made in the next fiscal year.

Thermal Power Guidelines

An emission guideline, prepared by Environment Canada for coal fired power plants, received during the previous fiscal year, is still being reviewed by the department.

A precipitation collection site was established at Stony Rapids as part of the province's acid rain monitoring program.

Water Pollution Control Branch

- manages water quality and controls pollution through programs of approvals, inspections, and technical assistance for water and sewage works;
- maintains surveillance of provincial waters;
- co-ordinates collection of samples of surface waters, sediments and effluents and interprets data on natural water quality and on raw and treated waters and wastewaters;
- upgrades the skills of operators of municipal water and sewage works and develops and administers a system of voluntary certification;
- establishes quality objectives, sets design and operational guidelines for water and sewage works and recommends conditions for their operation;
- controls pollution through a program of approvals and inspections for industrial wastewater treatment works;
- issues permits and provides advice for aquatic nuisance control;
- investigates complaints about water pollution and recommends improvements;
- assesses water quality components of environmental impact studies and provides water quality advice.

Municipal

Approvals and Inspection

During the fiscal year eight new water and sewage works became operational. The branch issued new operating approvals to four waterworks and four sewage works and renewed 134 operating approvals. At year end, there were 506 waterworks and 480 sewage works in operation. In addition, 405 construction approvals were issued for the construction, alteration or extension of water and sewage facilities. Construction costs for the facilities were approximately $50 million.

A total of 79 visits to 76 municipalities were made by branch staff to inspect water and sewage works or provide technical assistance.

Free Analyses Program

The branch continued to provide two free municipal sewage effluent analyses to Saskatchewan communities. The analyses are done by the provincial laboratories in Regina.

This program was initiated to help monitor sewage treatment facilities and various effluent qualities. The service was used by 156 communities operating sewage works.

Municipal Operator Training

The Operator Training and Certification Committee is comprised of six operators from various areas of the province.

At the end of the fiscal year there were 221 certified operators under the voluntary operator certification program.

Operators are classified at the same level as the facility they operate. All municipal water and wastewater facilities have now been classified according to the accepted formula based on unit process complexity, population served and relative water production of wastewater flow.

During the past year, 12 training sessions and regional operator meetings were held throughout the province. Total attendance was 518 persons. One of the training sessions included a gas chlorination workshop where students were taught the components and operation of a gas chlorination system and were given safety training.

The branch administered the Western Canada Water and Sewage Correspondence Course for operators of municipal surface water treatment plants. Seven operators successfully completed the course.

Industrial

Approvals and Inspection

Industrial operations that discharge wastes directly into receiving waters must obtain approvals to construct and operate treatment works under The Water Pollution Control Regulations.

During the report year, three approvals to construct pollution control works were issued to: Echo Lake Fish Hatchery; Co-op Refinery, Regina and Boundary Dam Power Station. Thirteen approvals to operate pollution control works and two extensions to existing certificates were issued to: ARMAK, Saskatoon Chemicals, Saskatchewan Power Corporation Boundary Dam, IPSCO, CSP Foods, Prince Albert Pulp Mill, Saskatchewan Power Corporation Poplar River Power Plant, Saskatchewan Minerals, Fresh Water Fish Marketing, Sask Oil and Gas Carbon Dioxide Pilot Plant, Saskatchewan Power Corporation Queen Elizabeth Power Plant,

Kleyson's Transport, PCS-Allan sewage works, Gulf Oil Asphalt Plant, and the Nipawin Hydro Electric Project for sewage works.

Branch staff made 15 visits to the industries to inspect pollution control systems or hold special meetings.

Prince Albert Pulp Company Ltd., Pulp Mill

The quality of wastewater discharged from the pulp mill was consistent with past years. The number of limit excursions decreased from 29 to three during the fiscal year.

Saskatoon Chemicals

The quality of effluent discharged by Saskatoon Chemicals generally improved in the fiscal year with three mercury, one residual chlorine and four chromium excursions of the discharge limits.

ARMAK Chemicals Ltd., Saskatoon

The chemical oxygen demand increased by 30 per cent over the previous five year average to 420 kg/day. Ammonia nitrogen loadings increased compared to the previus year, but still remained below the five-year average. There were 10 ammonia nitrogen and 14 nickel loading excursions in the fiscal year; pH control continued to be a problem.

CSP Foods, Nipawin

The oil seed crushing and refining operation near Nipawin continued to produce crude and refined edible oil products. Effluent quality improved significantly in recent years, however, for the report year effluent quality decreased. The company had 14 ammonia nitrogen and six pH excursions.

SPC Poplar River Power Plant

Boron and total dissolved solids in the East Poplar River were below the long-term and short-term objectives recommended to the Governments by the International Joint Commision (IJC). There were no discernible trends from pre-project conditions. Water quality was acceptable, based on the objectives recommended by the International Poplar River Water Quality Board to the IJC, with one excursion being observed for total zinc. The rate of ground water seepage from the ash lagoon was computed to be lower than the established standards for the Poplar River plant.

Surface Water

Water Quality Monitoring

Water quality trends of Saskatchewan surface waters were continuously monitored. During the fiscal year 1,729 water samples were collected and 37,147 analyses performed.

A summary of activities is shown in Table 4. Table 5 summarizes the water quality in the Qu'Appelle basin.

Data Handling

During the report year, work continued on the final stages of a computer based data handling system called Biodat. This system was designed to store and retrieve biological data accumulated by the branch through monitoring, special projects and information provided by other agencies.

This system is to be integrated with the chemical water quality data stored on Esquadat, first implemented in 1978.

Table 4 — Water Quality Sampling Statistics

Type of Sample		Samples	Average Number of Analyses Per Sample	Analyses Per Location for Year
Surface Water (basin)	Qu'Appelle	370	27	7,086
	North Saskatchewan	39	30	1,170
	South Saskatchewan	84	28	2,352
	Saskatchewan	36	32	1,152
	Souris	63	36	2,268
	Missouri	29	21	609
	Northern Contract[1]	13	83	1,079
	Other	47	21	987
Municipal	Water-chemical	75	N/A	430
	Bacteriological	12,656	1	12,656
	Sewage	146	N/A	2,416
	Free analysis	232	18	4,176
	Effluent Irrigation	6	30	180
Industrial (company samples)	Papco, Prince Albert	255	14	
		34	27	5,609
	Saskatoon Chemicals	378	8	
		86	5	3,827
	Armak, Saskatoon	316	2	
		40	23	1,652
	CSP Foods	245	8	
		24	6	1,920
	Canadian Pacific Rail, Moose Jaw	4	7	133
	SPC-Poplar	169	49	
		544	N/A	8,502
	Other	16	N/A	230
Industrial (department sampling)	Papco, Prince Albert	10	20	200
	Saskatoon Chemicals	11	16	176
	Armak	9	16	144
	CSP Foods	6	21	126
	Other	39	N/A	934
Special Studies	Intensive studies	203	40	8,120
	Arsenic in drinking water	122	1	122
	Spring runoff	9	N/A	332
	Complaints	73	N/A	1,273
	Sediments	15	N/A	140
	Plankton	394	1	394
	Quality control	67	18	1,206
	Miscellaneous	40	N/A	609

[1] Churchill River and Lake Athabasca basins
N/A — Not Applicable

Table 5—Waterbodies in the Qu'Appelle Basin—range of concentration

	Dissolved Oxygen		5 Day BOD*		Volatile Suspended Solids		Total Phosphorous As P		Total Kjeldahl Nitrogen	
Lake	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar	May-Oct	Jan.-Mar.	May-Oct	Jan.-Mar	May-Oct	Jan.-Mar.
Buffalo Pound	6.3-12.5	5.0 >20.0	1.4-4.6	0.8-1.6	2-23	2-4	08-18	06-21	08-1.8	0.8-1.4
Pasqua Echo Mission Katepwa Crooked Round Last Mountain	0.150-10.7		2.8-6.5	Not sampled in 1982-83	4-10		10-41		1.7-2.1	
Humboldt	6.3-15.1		5.5-10.4		10-47		35-64		2.8-7.2	

* BOD biochemical oxygen/demand.
Ranges given in milligrams per litre.

Interagency Activities

Intensive Livestock Operations

Under The Pollution (by Livestock) Control Act, intensive livestock operations must receive prior approval for pollution control measures from Saskatchewan Environment before permits can be issued by Saskatchewan Agriculture.

During the report year 102 applications were reviewed and 94 approved.

Solid Waste Managment

Under The Public Health Act, municipalities with populations under 5,000 were allowed to operate modified landfill systems. The department reviewed 14 landfill site applications and provided comments to Saskatchewan Health, the agency responsible for regulation of landfills.

Biocide Regulation and Research

The branch issued 39 approvals for the application of biocides to public surface water, primarily for control of algae and other plant growth. Twenty-eight approvals were given for use of 14 other chemicals or mixtures for special applications.

The branch was involved in several informal discussions concerning relative aspects of biocides and human health. These topics ranged from aerial application of biocides and their effect on populated areas to the general health aspects of registered and non-registered chemicals.

Studies

Spring Runoff

Normal precipitation throughout the 1981-82 winter produced an average spring runoff. Seven municipal discharges, one intensive livestock operation, 10 industrial effluents, Regina wells and general source waters were investigated.

Mercury in Fish in Saskatchewan Waters

The branch continued to participate in an interdepartmental committee to review mercury concentrations in Saskatchewan fish. The main purposes of the committee are to advise Saskatchewan Health of hazardous mercury concentrations, to advise Saskatchewan Tourism and Renewable Resources about licensing restrictions and to develop schedules for monitoring the mercury concentrations in provincial fish. In the last function the branch assisted in developing statistical guidelines for the sampling and evaluation program.

Recreational Lakes

An intensive water quality study was initiated at Emma and Christopher Lakes in August, 1981. The study was designed to identify water quality concerns and to gather data for assessing the long-term influences of recreational usage and development on lake water quality. Four seasonal surveys were carried out in 1981 and 1982. Samples were analyzed for heavy metals, routine chemical variables and bacteria. Fish, benthos, macrophyte and bacteriological samples were also obtained.

A comprehensive report on the findings of the field study was undertaken.

North Saskatchewan River

A water quality study of the North Saskatchewan River was initiated in July, 1981. The study was designed to obtain baseline water quality data for the river and identify effluent sources and levels of wastewater pollutants in the river. Sampling surveys were hindered due to high summer river flows and high suspended sediment levels. A report on the data collected to December, 1982 is being prepared.

Mercury Clean-up at Thunder Creek

In 1979 a dredging program identified potential mercury contamination in the sediments of Moose Jaw River and Thunder Creek. In 1981 a Moose Jaw mercury control project was implemented to remove and secure the highest levels of mercury laden sediments. This was completed in 1982 and although the immediate area continues to have abnormal mercury levels, the containment project provides added protection for downstream waterbodies.

Procedures Manual

A comprehensive review and update of the branch procedures manual was initiated during the year. In particular, a more detailed section on ground water monitoring was developed.

Water Quality Monitoring Network

An extensive revision of the provincial water quality network was undertaken. Programs were priorized and a shift occurred from routine monitoring to special study and problem oriented monitoring.

Humboldt Lake Water Chemistry

A report was completed concerning the water chemistry, primary production and algae populations of Humboldt Lake during the period 1968-1969 and 1974-1981.

Uranium Removal

A literature search concerning options for uranium removal from drinking water was completed.

Report on Activated Carbon

During the fiscal year the branch prepared a report entitled Introduction to Taste and Odour Control in Municipal Water Treatment Using Activated Carbon.

Wascana Creek Water Quality

Wascana Creek and the Qu'Appelle River in the Lumsden/Craven area are used in the summer for livestock watering and intensive market garden irrigation. Based upon observations of elevated coliform bacteria levels occurring in the creek and river in 1981, extensive bacteriological monitoring was initiated in 1982 to further assess the water quality and to determine the potential sources or causes for periodically observed elevated bacteria levels. Monitoring results are being evaluated.

Chlorination Guidelines

The branch published Guidelines for Chlorine Gas Storage and Usage. The document was developed over a three-year period by a committee of representatives from the departments of health, labour and environment.

Municipal Sewage Lagoon Guidelines

The branch published a booklet entitled Two-cell Lagoon Operation and Maintenance. This booklet describes the purpose for a community sewage treatment lagoon and the proper method of operating the system.

Boundary Reservoir Water Quality

The City of Estevan and the PFRA reviewed options for Estevan's water supply intake. One alternative involved a water supply pipeline directly from Boundary Reservoir. At the request of the City, branch personnel have undertaken a preliminary asessment of the historical (1971-82) and recent (March, 1983) Boundary Reservoir water quality data.

Operating Approval Terms

The possibility of extending the operating approval terms for municipal water and sewage works was examined in a brief prepared by the branch. Recommendations of the brief have been adopted, and provide a set of criteria by which communities can qualify for operating approval terms of up to 10 years.

Procedures for Processing Construction Approvals

During the year, the entire process involved in issuing approval to construct municipal water and sewage works was analyzed by the branch. The objectives of this activity were to streamline and improve the system used to process client applications.

Yersinia in Aquatic Environments

A report concerning laboratory procedures of use in the isolation and enumeration of *Yersinia euterocolitica*-like bacteria in aquatic environments was completed. The report provides instruction on the methods to assess the selectivity, specificity and accuracy of routine bacteriological test procedures.

Arsenic Survey on Municipal Drinking Water

In the 1981-82 fiscal year, arsenic measurements were taken on water from City of Regina wells. Testing indicated that all the wells had detectable levels of arsenic and that all of the concentrations were well below the maximum acceptable concentration for drinking water of 50 parts per billion or 0.05 mg/L. Further well sampling in the spring of 1982 also indicated arsenic levels well below the maximum acceptable concentration.

A survey of municipal supplies throughout the province was completed in 1982 with approximately 125 different water supplies being tested. The 1982-83 survey as in the 1981-82 survey, indicated that all the water supplies tested were within the 50 part per billion limit for drinking water.

Water Hearings

Branch staff provided technical support to the Cabinet Committee on Water Concerns. Hearings were held by the committee in ten major Saskatchewan communities during February-March, 1983. Over 200 briefs on water concerns were presented during the hearings.

Land Protection Branch

- develops and administers management programs for urban areas subject to severe flooding;
- develops and administers hazardous waste management programs;
- develops and administers, in co-operation with other departments, shoreland management policies and programs;
- administers The Reservoir Development Area Regulations for designated areas;
- administers The Environmental Spill Control Regulations;
- co-operates with other departments in investigating and promoting opportunities for recycling waste material;
- offers technical assistance to other departments in evaluating proposed waste disposal activities;
- administers The Litter Control Act and Regulations pertaining to beverage containers.

Land Management Division

Floodplain Management Program

General Investigations and Policy Development

The division provides information on flood hazard potential affecting development proposals to other provincial departments, municipalities and private interests.

During the year, the division reviewed 33 subdivision proposals in urban centres in the province to assess the degree of flood risk, the impacts of the land uses and the feasibility of using floodproofing techniques. In addition, technical comments were provided on ten proposed bridge designs and floodproofing guidelines were provided for four development projects. One zoning bylaw was also reviewed and the comments made provided the basis for the floodplain management section of the bylaw.

Development of a provincial water resource management data base, necessary for floodplain management, has been a major thrust of the division over the past several years. The spring of 1982 also saw several federal and provincial agencies co-operating to gather a significant amount of flood flow and stage data in the Souris River basin, and in Moose Jaw, Regina and the Qu'Appelle.

Although the data have not been finalized, it appears that Lumsden received the second highest flow on record, Moose Jaw third highest and Estevan, Regina and Weyburn approximately fourth highest. Much of the Qu'Appelle system experienced above average lake levels over the summer.

During the year, the division's major contribution to data base development was the collection of floodplain use data in ten Saskatchewan communities. The communities involved were the Battlefords, Carrot River, Craven, La Ronge, Prince Albert, Regina, Roche Percée, Saskatoon, Tantallon and Tisdale. The data will contribute to the development of provincial floodplain management policies, and will be used to assist these communities in floodplain management planning and development.

Substantial progress was made on policy development. A review of the design flood frequency for communities located on rivers and streams was almost complete at year end. Work was well underway at year end on a policy on the use of dykes as floodproofing and the treatment of low lying areas located behind dykes.

Substantial progress was also made on a comprehensive flood control strategy for Weyburn. The strategy is aimed at drawing together the results of all flood control analyses done for Weyburn over the past decade, and proposing an action plan that is acceptable to the municipal, provincial and federal governments.

Canada-Saskatchewan Flood Damage Reduction Program (FDRP)

In April, 1977, two flood damage reduction agreements were signed between Saskatchewan Environment and Environment Canada. One agreement outlines the broad goal of the two governments, which is to reduce damage in flood hazard areas through better floodplain managment. The second, a five year $1.7 million cost-shared mapping and studies agreement, provided for the completion of studies, maps and the designation of flood hazard areas. Similar agreements are in effect in most other provinces.

Committees were established under each agreement. The division is represented on the steering and technical committees and acts as program co-ordinator of the mapping and studies subagreement. The division finances and administers mapping and studies, largely by contract to the public and private sectors, then normally

shares the expenses with Environment Canada. Inspection of floodplain management studies is also conducted within the division.

On February 1, 1982, the minister directed the deferral of new designations pending the development of post-designation policies and programs and a review of the program's management structure. The deferral was in response to valid public concern raised about the impact of the FDRP in designated areas. It is to remain in effect until substantial progress has been made on the development of appropriate post-designation policies and programs regarding matters such as property acquisition and relocation, floodproofing assistance, and the construction of flood control works. Related policy development is well underway, and was reported in the previous section of this report.

At year end a review of the program's management structure had been completed within the branch, and was being prepared for review by senior department personnel. While the management structure review was underway the mapping and studies agreement expired April 13, 1982. The province indicated to Canada that it was not prepared to discuss renewing the Agreement until the management review was completed, and substantial progress was achieved on development of post-designation policies and programs. This is expected to be attained by the end of the 1983 calendar year.

Since the mapping and studies agreement had expired, technical work during the year was limited primarily to completing studies begun before the expiry. However, one major project, a planning study for Lumsden, was begun. Table 6 shows the current status of technical work under the mapping and studies program.

Because of the deferral of new designations by the provincial minister no new designations were undertaken. To date, the following designations have taken place: Estevan, Oxbow and Roche Percée on August 1, 1980 and Moose Jaw on October 15, 1981.

Table 6 — Mapping and Studies Program Status

Community	Air Photos and Ground Survey	Base Mapping	Hydrology Study	Hydraulic Study	Planning Study	Information Map
Battlefords	Complete	Complete	Complete			
Beauval[x]						
Big River[x]						
Buffalo Narrows	Complete	Complete				
Carrot River	Complete	Complete	Under way			
Craven	Complete	Complete	Under way	Under way	N/A	
Eastend	Complete	Complete	Complete	Complete	Complete	
Estevan	Complete	Complete	Complete			
Fort Qu'Appelle	Complete	Complete	Under way			
Gravelbourg	Complete		Complete			
Green Lake	Complete	Complete				
Hodgeville	Complete	Complete	Complete		N/A	
Ile-a-la-Crosse	Complete	Complete				
Kamsack	Complete	Complete	Under way			
La Ronge	Complete	Complete	Complete	Complete		
Lebret	Complete	Complete	Complete	Under way		
Lumsden	Complete	Complete	Under way	Under way	Under way	
Melfort	Complete	Complete	Complete	Complete	N/A	On hold
Moose Jaw	Complete	Complete	Complete	Complete	Complete	Complete
Oxbow	Complete	Complete	Complete			
Prince Albert	Complete	Complete	Complete	Under way		
Radville	Complete	Complete	Complete			
Regina	Complete	Complete	Complete	Under way		
Roche Percée	Complete	Complete	Complete			
Saskatoon	Complete	Complete	Complete	Under way		
Swift Current	Complete	Complete	Complete	Complete	Complete	On hold
Tantallon	Complete	Complete	Under way	Under way		
Tisdale	Complete	Complete	Complete			
Val Marie	Complete	Complete	Complete		N/A	
Weyburn	Complete	Complete	Complete	Complete	Under way	On hold
Yorkton*	Complete	Complete				

N/A — No planning study anticipated for this community

* — is being added to the program. x — to be deleted from program.

Shoreland Management Program

Reservoir Development Areas

Under The Water Resources Management Act, revisions were under way to update The Reservoir Development Area Regulations, 1976, and The Recreation (Residential) District Building Regulations, 1969.

To date, seven designated provincial reservoir development areas, containing 5,700 square kilometres, were established pursuant to the provisions of The Water Resources Management Act: Lake Diefenbaker, Blackstrap, Brightwater, Bradwell, Zelma, Dellwood and Avonlea.

Under The Reservoir Development Area Regulations, development permits must be obtained from the department before construction or land use changes can proceed. Development plans were prepared for the reservoirs at an early date to achieve compatibility between the land and water uses of the reservoir areas to ensure environment quality control.

During the year, the branch issued 27 development permits at Lake Diefenbaker, four at Bradwell reservoir, four at Blackstrap reservoir and one each at Brightwater and Dellwood reservoirs. Out of the 37 permits issued, 31 were for agricultural purposes, two for recreational purposes, two for electrical transmission lines and one each for a gravel pit and a residential site.

Division staff provided technical and professional advice to anyone considering development around water bodies, whether or not the development was within a reservoir development area.

All municipal offices within the reservoir development areas were visited during the year to make sure local officials were familiar with the reservoir development area concept and objectives. These visits allowed for informal discussion of the regulations, identification of problems in the development area and discussion of local concerns.

Contacts with cottage owners' associations and municipalities to implement updated building standards and zoning bylaws for cottage areas within reservoir development areas were completed during the fiscal year.

Signs posted along roads leading into reservoir development areas were redesigned recently to conform to the provincial visual identity program. Technical staff will be using these new signs as needed to replace existing signs as they become unserviceable due to weathering or other reasons.

Subdivision Proposals

Subdivision proposals throughout the province are examined by the division to ensure that development proposals are not subject to soil instability, flooding, or other hazards. These problems are of particular concern to large developments located on hillsides or close to water bodies.

During the fiscal year, 64 shoreland subdivision proposals, 37 country residential subdivision proposals, 28 commercial/industrial proposals, eight proposals for municipal services and 16 other proposals for various purposes were reviewed by division staff.

These proposals were referred to the branch by Saskatchewan Urban Affairs, Saskatchewan Rural Affairs and Northern Saskatchewan. After reviewing their environmental suitability and possible impact on other nearby uses, the branch provided comments and guidelines to the referring departments.

Studies

Work begun in 1981-82 to establish development criteria intended to safeguard environmental quality, particularly within reservoir development areas was completed and made available to interested parties prior to year end.

Investigations

Investigations carried out on reported shoreland problems, included the dumping of debris into lakebeds and rivers, overcrowding in shoreland areas, particularly around smaller lakes, boating conflicts, public access along the water's edge, and assessing physical hazards at specific sites.

Project Reviews

During the report year the division examined ten environmental impact statements and two other reports, from a land use and land protection perspective, for the environmental assessment secretariat. Four other studies or reports, referred by other agencies or branches, were also reviewed.

Waste Management Division

Hazardous Wastes

The management of hazardous waste within the province is a concern to industry, all levels of government, and the public. During this fiscal year, the department continued its investigation into the storage, treatment and disposal of hazardous waste.

An inventory of chemical waste currently generated in Saskatchewan was completed for the department by M. M. Dillon Ltd. using a direct questionnaire approach. The results showed that there is approximately 22 500 tonnes of chemical waste generated annually. This amount is down considerably from the 46 000 tonnes estimated in an earlier theoretical inventory. The consultant further examined waste treatment and disposal alternatives available to the province to deal with the waste.

Work establishing a waste tracking system advanced with the purchase of micro-processing hardware and software for information storage and retrieval. Once on-line, this sytem will enable the movement of hazardous waste to be traced from the point of generation through to disposal using information generated by The Transportation of Dangerous Goods Act Program. A federal-provincial study on active and abondoned landfills in Saskatchewan was carried out. The study provided a preliminary environmental assessement of the conditions existing at 1,324 sites, of which 958 were active and 366 were inactive.

Pesticide Container Disposal Program

In response to numerous requests from concerned groups, a program was developed to deal with the proper disposal of pesticide containers and associated residues.

There are approximately one million pesticide containers sold annually in the province. Approximately 70 per cent of the total containers are metal; the remainder are primarily plastic. Surveys conducted by the Saskatchewan Safety Council in 1981 and 1982 show that a large number of these containers are not disposed appropriately. During the fiscal year the department reviewed a number of programs currently in place in other jurisdictions and selected a collection/crushing/disposal program for Saskatchewan.

Phase I of the program is expected to be implemented by the 1983 crop year. Rural municipalities have been asked to participate by establishing and maintaining collection sites. The department has developed guidelines to assist municipalities in their siting activities. A contractor will be retained by the department to crush the containers and collect the residue. The scrap will be available for recycling purposes and the residue will be shipped out of the province for disposal.

Waste Disposal

The department provides technical information and assistance to the public, industry and other government departments. Throughout the fiscal year, there were 106 requests for advice on disposal of potentially toxic wastes.

The department reviewed applications for 75 liquid domestic waste haulers and 14 landfill sites submitted by Saskatchewan Health. There were 29 projects reviewed for Saskatchewan Energy and Mines that dealt with land spreading of petroleum wastes.

The department further reviewed and commented on comprehensive site investigation studies carried out at the University of Saskatchewan, City of Regina, and City of Saskatoon landfill sites.

Beverage Containers

The number of complaints handled about the failure by vendors to comply with bottle refund regulations decreased for the third year from 22 to 12.

Spill Response and Control Section

During this fiscal year, the Spill Report Centre received over 900 calls on their 24-hour emergency number. The centre handled 191 spills that were reported under The Environmental Spill Control Regulations and dealt with numerous complaints and requests for information concerning waste handling and disposal. Staff assisted with an additional 65 reported incidents where there was either no discharge into the environment, or the volume of spilt material was below the reportable limit, or involved hazardous materials but there was no actual spill.

Other spill reports associated with the production or distribution of oil or gas, regulated under The Oil and Gas Conservation Act, were referred to Saskatchewan Energy and Mines.

On the advice of the Department's legal counsel, Section 3 and 9 of the Saskatchewan Environmental Spill Control Regulations were rewritten to provide better clarity of intent and of content. A few omissions and typing errors in the Regulations were also identified. It is anticipated that the amendments will be enacted in 1983.

Table 7 summarizes the number of spills reported, the product, the total volume spilled, and the quantity recovered where applicable. Similar to last year's statistics, petroleum products account for 66 per cent of the total spills. A further breakdown of this category is shown in Table 8. Transportation and service station tank leaks, tank overflows or equipment failure, were the major sources of spills.

Other spilled products categorized as non-petroleum products include agricultural chemicals, acids and bases, waste products and other organic and inorganic chemicals.

Training is an ongoing activity for the department's spill control team members. Two workshops held for spill team members and other department personnel discussed safety equipment, response to pesticide spills and the emergency response to atmospheric release of hazardous substances.

There were 153 visits made to spill sites to investigate, inspect and supervise remedial measures.

Work continued on the spill response field manual initiated during the 1981-82 fiscal year. Current sections of the manual include expert contacts, municipal emergency contacts, response guidelines, and other related information.

Underground Fuel Storage Tank Leaks

During the fiscal year, there were 17 reported incidents involving leaking underground storage tanks at various petroleum products installations. In some cases, these leaks had gone undetected for some time, and had caused the detection of gasoline or its vapor in nearby sewage systems. One such incident in Kendal resulted in an explosion in the basement of a nearby building. Another incident, where gasoline was detected in a private well at the Town of Gull Lake, resulted in an investigation by department staff who traced the source to a bulk station a few blocks away. More than 3 000 litres of petroleum products have been recovered since the company installed recovery sumps. The company is continuing the recovery process and has installed an alternate water supply to replace the well.

Uranium, Oil, Slurry Spills at Mine Sites

A total of 13 spills of tailing process water from the province's three operating mines were reported. The spills occurred at the mine sites and were caused by a transport incident, a tailing line leak or gravimetric pond overflow. Clean-up measures were promptly undertaken by the companies by returning liquid to the tailings pond and/or hauling contaminated materials from the spill area to the tailings area. Gamma surveys were performed before and after the clean-up to ensure that appropriate clean-up measures had been completed. The Mines Pollution Control Branch staff inspected all of the spill areas during visits to the mines.

PCB Spill at Federal Pioneer Limited (FPL), Regina

Following the implementation of an interim clean-up and containment program directed by Saskatchewan Environment to deal with the polychlorinated biphenyls (PCBs) spill at FPL's Regina plant, an extensive site surveillance and monitoring program was conducted by the company in 1982. Program results indicated that the containment and other remedial measures were effective and satisfactory. The surveillance and monitoring program at the site will continue.

Pipeline Gasoline Spill Near Delisle

Accidental rupturing of an underground pipeline near Delisle resulted in the release of 23,000 litres of gasoline into surrounding soil. The company responded promptly by shutting down the pipe, drilling test holes to delineate the extent of contamination and removing the gasoline contaminated soil. After assessing the remedial actions recommended by a geotechnical consulting firm, the contaminated soil was removed and spread thinly on a contained site to facilitiate the evaporation and natural degradation of gasoline.

Table 7 — Spill Statistics by Product, Number of Incidents and Quantity

Product Spilled	Number of Incidents	Volume Spilled (m^3)	Volume Recovered
1. **Petroleum Products**			
(a) Gasoline	61	222	11
(b) Diesel and heating fuel	40	159	3
(c) Asphalt/crude oil	10	279	270
(d) Natural gas*	1	10 118	–
(e) Others	15	50	–
Subtotal	127	10 828	284
2. **Non-petroleum products**			
(a) Agricultural chemicals	7	5	–
(b) Acids/bases	6	20	–
(c) Uranium mine tailing water	13	812	–
(d) Other organic/inorganic substances	12	59	–
(e) Waste products	17	8 501	–
(f) Miscellaneous	9	5	–
Subtotal	64	9 402	
Total	191	20 230	

* A natural gas line that ruptured in Regina has resulted in a large increase in volume spilled.

Table 8 — Petroleum Product Spill Statistics by Cause, Number of Incidents and Quantity

Cause of Spill	Number	Volume Spilled (m^3)
Above ground tank leak	5	170
Below ground tank leak	17	37
Tank overflow	18	30
Transportation incident	22	134
Railroad incident	2	20
Equipment failure	21	28
Line leak	15	10 295
Others/unknown	27	114
Total	127	10 828

Mines Pollution Control Branch

- administers a program to control the environmental effects of all mining development through licensing, monitoring, and inspections;
- inspects operations and conducts monitoring of effluents and receiving waters at mine sites;
- evaluates the technical aspects of the design and construction of solid and liquid waste management systems and air pollution control facilities;
- administers a program to protect the public from unusually high levels of naturally occurring radiation.

Administration

Branch Development

Saskatchewan Environment is directly responsible for setting and enforcing environmental protection standards for all mining and milling operations in the province.

In January, 1980, responsibility for preventing environmental damage caused by the uranium mining industry was transferred from Saskatchewan Mineral Resources to Saskatchewan Environment. Until that time, the environment department acted as a consultant to Saskatchewan Mineral Resources, recommending controls for mine development and operation.

During the 1981-82 fiscal year, the branch's mandated was expanded to include all mining operations in the province.

Legislation

During the fiscal year, work on the draft uranium mining pollution control regulation continued with a legal review of the draft being completed.

Mines Division

Uranium Mine Operation

The division is responsible for licensing, monitoring and inspecting all uranium mining operations in the province. Staff visit sites to make inspections and take samples. In addition, companies are required to monitor all aspects of the environment on a regular basis and submit the data to the division. The public has access to all licences issued and monitoring data.

During the report period one of the three operating uranium mines in the province, Eldorado Nuclear, permanently shut down effective June 30, 1982. Since that time, an approved decommissioning plan has been implemented to satisfactorily close out the mill and mining facilities. Work is also progressing on the final development of a close out for the different wastes such as tailings and treatment sludges that have accumulated on the site over the last 30 years. Several meetings were held between the company and various regulatory agencies and general agreement was reached on the approach the company was to take in their decommissioning and reclamation programs.

Key Lake Mining Corporation began development work on the Gaertner Pit, and construction of the mill and the ore handling facilities. Mill production is scheduled for operation by late 1983. The tailings management area was also constructed during the fiscal year with final completion scheduled during spring of 1983. Additional inspections were carried out during this construction phase to verify as-built status of the ore handling facilities, low level waste storage, treatment ponds and the newly designed tailings management area. The company was required to submit more than 2,500 separate analyses to monitor this construction and development stage.

Branch staff conducted 40 on-site inspections of the operating facilities and 17 on-site inspections of the proposed or developing mines. Over 95 water quality samples were taken during the inspections which resulted in more than 4,000 analyses being conducted. In addition, operating mines were required to conduct more than 12,000 separate analyses to monitor the environmental impact of mine production.

Potash Mine Operations

During the fiscal year, all potash mines in the province were licensed under The Department of the Environment Act.

Coal Mine Operations

During the fiscal year the mines licensing program was expanded to include coal mining operations in the province. Three of the mines were under licence during the year and work continued on the licensing of the remaining three mines.

Mine Abandonment

During the report period, the branch conducted additional studies into the Newcor mine site at Creighton to develop the information base needed to implement a cleanup plan.

Radiation Division

Uranium City Cleanup

The division managed the provincial involvement in the Uranium City radiation cleanup program which was completed during the 1981-82 fiscal year. The division is involved in the ongoing maintenance of the equipment installed during the program.

Due to the closure of the Eldorado Nuclear mine, the ongoing maintenance program will be reduced significantly during the next fiscal year.

Natural Radiation

Uranium is present in most Saskatchewan soils. To prevent a situation similar to that of Uranium City, the division is undertaking a province-wide study to identify other areas where the possibility of natural background levels of radiation in the soil are high. The study is expected to take several years to complete.

The first phase of the study was conducted in 16 non-mining northern Saskatchewan communities during the summer and fall. A summary report for public information was released in 1981.

The second phase of the study involved a survey of communities in the southeast portion of the province. A report on this work is presently being prepared.

Interagency Activities

All aspects of uranium exploration and development which involve over 10 kilograms of uranium require licensing by the Atomic Energy Control Board (AECB). The AECB is concerned primarily with control of uranium from the ore body through its intended use and also with any radioactive waste disposal. The branch works closely with the board to ensure there is no conflict of objectives and to minimize overlap in the control.

Northern Saskatchewan was responsible for negotiating and issuing surface lease agreements to companies developing uranium resources. The branch works closely with the department in developing and implementing sections dealing with environmental and abandonment concerns.

Three agencies, the Atomic Energy Control Board, the federal Ministry of Transport, and Saskatchewan Environment are involved with the transportation of hazardous substances. The Mines Pollution Control Branch assists with inspections and remedial actions for spills of materials to and from mining operations.

Branch staff make monthly inspections of water treatment facilities at mining operations.

Water Management Service

S. R. Blackwell, Executive Director

D. L. MacLeod, Director
Hydrology Branch

A. L. Jones, Director
Water Rights Branch

A. C. Schuster, Director
Qu'Appelle Implementation Branch

Water Management Service

General

The Water Management Service is responsible for over-all management and regulation of the province's water resources. Through two of its major branches, the service provides basin studies, streamflow monitoring and forecasting, project operation, central hydrologic and geohydrologic services and licensing of water use and drainage. The service also administers water use, drainage, and water use charges, participates in interjurisdictional water matters and maintains water resource inventories.

The Water Management Service is responsible for implementing three federal-provincial agreements. The Canada-Saskatchewan Qu'Appelle Agreement is administered through the Qu'Appelle Implementation Branch. Management of the Canada-Saskatchewan Interim Subsidiary Agreement on Water Development and the Hydrometric Surveys Agreement is represented by the executive director.

Qu'Appelle Implementation

On October 6, 1975, the governments of Canada and Saskatchewan signed a ten-year, $33.7 million agreement to improve the management of land and water resources and to develop the recreation and tourist industry in the Qu'Appelle Valley. Under the terms of the Qu'Appelle Agreement, an eight-member board was established to provide over-all management of the agreement and to approve implementation activities to be undertaken for the purpose of meeting the objectives of the agreement. The executive director of the Water Management Service serves as alternate to the deputy minister who is co-chairman of this board.

Details of this year's activities under this agreement appear under the Qu'Appelle Implementation Branch section of this report.

Water Development

The three-year Canada-Saskatchewan Interim Subsidiary Agreement on Water Development for Regional Economic Expansion and Drought Proofing (SAW) signed May 17, 1979, was extended to March 31, 1984, primarily to accommodate the completion of the drought studies. The general intent of the agreement is to improve the potential for economic and social-economic development by lessening the effects of recurrent water shortages, droughts and flooding. SAW provides for work in three sectors: Sector A — water management activities; Sector B — water supply and Sector C — flood damage reduction. The purpose of the drought studies in Sector A is to evaluate the impacts of droughts on the Saskatchewan economy and to develop long-term strategies to alleviate the impacts. Phase I studies were completed in the fiscal year and will be featured at a workshop in Regina on April 28-29, 1983, when management and technical representatives from both senior governments and the private sector will be invited to hear and discuss the results of drought studies to date. Phases II and III of the drought studies are planned to run concurrently during the next one and one-half years.

Sector A also provides for ground water studies and surface water investigations. Three ground water aquifers have been explored:

- Estevan Valley Aquifer near Macoun — A field program was completed in the fall of 1982. Preparation of a final report was in progress at year end;
- a portion of the Hatfield Valley Aquifer (Melville, Wynyard and Waterhen areas) — The Saskatchewan Research Council completed the field work and is expected to produce final reports on all three areas by May 31, 1983;
- a portion of the Judith River Formation in southwestern Saskatchewan — The field work was completed in March, 1982 and the report on this work will be finalized early in 1983.

Sector B provides for the investigation and development of water supply projects. Communities where works have been built or are under construction include Birch Hills, Humboldt, Kipling, Melfort and Weyburn. A dam for the Village of Ceylon will be built in 1983. Centres where investigations have been completed and reports are being prepared include Grenfell, Kerrobert and Radville. Investigations are in progress at Maidstone, Manor, Melville, Redvers and Watrous. Additional work on ground water will be conducted for Canora.

Sector C, which provides for the implementation of certain flood damage reduction measures recommended in the Souris River Basin Report, has seen limited progress. Saskatchewan continued to review some basic policies and programs relating to flood damage reduction including the design flood, designation of flood hazard areas, and post-designation provisions.

Canada-Saskatchewan Hydrometric Surveys Agreement

Saskatchewan, represented by the executive director of the Water Management Service, and Environment Canada jointly administer the Hydrometric Surveys Agreement. The administrators of this agreement are responsible for administering the budget and for directing the technical committee that co-ordinates the day-to-day activities for this monitoring program.

Canada-Saskatchewan Consultative Committee

The six-member Canada-Saskatchewan Consultative Committee was set up under The Canada Water Act to discuss federal-provincial water programs and problems and to provide a senior review committee for federal-provincial study and implementation proposals. The department's deputy minister and the executive director of the Water Management Service are two of the three provincial members of this committee. The third member is from Saskatchewan Intergovernmental Affairs.

Prairie Provinces Water Board

The executive director of the Water Management Service represents Saskatchewan on the Prairie Provinces Water Board (PPWB). This board is responsible for administering the 1969 Master Agreement on Apportionment which applies to eastward flowing watercourses, and for co-operation and consultation among the three prairie provinces and Canada on interprovincial water matters.

The PPWB met in May, June and November during the report year. Considerable attention was given to the water demand study in the Saskatchewan-Nelson basin; the report was finalized and submitted to the ministers responsible for the board on December 1, 1982. The PPWB dealt with many other matters in addition to the administration of the 1969 apportionment agreement, including projects with interprovincial implications such as the Cold Lake Oil Sands Project, the proposed Slave River Hydro Development, Qu'Appelle River Conveyance, monitoring of water quality and quantity on the Cumberland Marshes Project, and the proposed Cumberland Lake control structure. Interprovincial ground water management, water quality and drainage, as well as apportionment of westward flowing tributaries of eastward flowing streams also received attention.

The Committee on Water Demand, established by the PPWB in 1978, was responsible for an inventory of historical and current use of water in the prairie portion of the Saskatchewan-Nelson basin water demand study. The main report and six appendices were finalized and widely distributed by the participating agencies.

The Hydrology Branch represents the province on the PPWB Committee on Hydrology. This committee is responsible for hydrologic studies needed by the board.

The Water Rights Branch represents the province on the PPWB Committee on Interjurisdictional Agreements Administration. The ground water division of this branch represents the department on the PPWB Committee on Ground Water.

Representation on the PPWB Committee on Water Quality is provided by the Water Pollution Control Branch.

South Saskatchewan Reservoir Board

This board was formed in 1968 following construction of the South Saskatchewan River project. It consists of two representatives of the federal government and two representatives of the province, one of whom is the executive director of the Water Management Service.

The board meets periodically to review project administration and to make decisions on operation planning for Lake Diefenbaker.

South Saskatchewan River Project

All control works and land associated with the South Saskatchewan River project were transferred from Canada to Saskatchewan, on April 1, 1969. Canada retained the responsibility for maintenance of the project until April 1, 1981, under terms of the 1959 agreement for project construction. A commitment from the federal government to continue maintaining this major project has been arranged with the Prairie Farm Rehabilitation Administration (PFRA) until 1986.

At year end, negotiations on an amendment to the 1958 agreement continued. These would commit Canada to further responsibilities on the project until March 31, 1994.

Mackenzie River Basin Committee

The executive director of the Water Management Service continued to serve as one of the province's two representatives on this committee. Three meetings were held during the fiscal year.

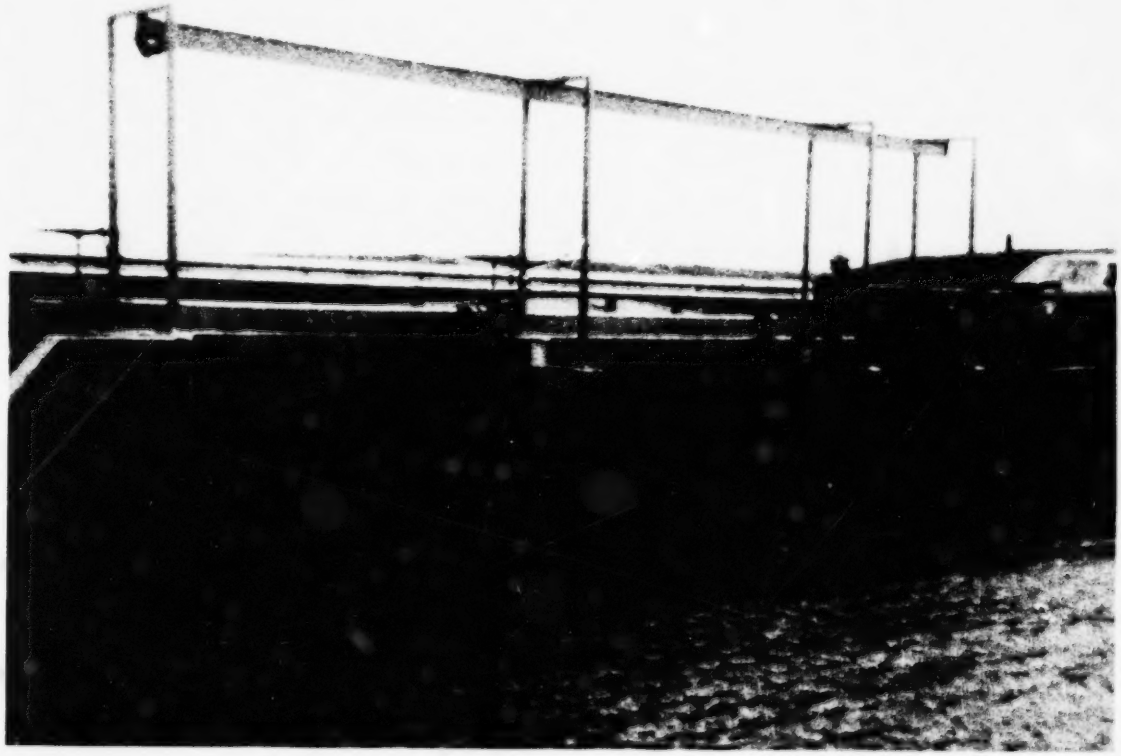
Primary focus during the report year was on methods of implementing the recommendations contained in the Mackenzie River Basin Study Report — August, 1981. The primary interest of all jurisdictions was the first recommendation which calls for development of an interjurisdictional agreement on the management of the water resources of the basin.

Cumberland Lake Control Structure Proposal

This proposal resulted because water resource developments in the Saskatchewan River basin upstream of the Cumberland Lake area have altered the amount and pattern of the flow into Cumberland Lake.

Beginning in late 1980, environmental and engineering studies were initiated. Preliminary engineering designs, including cost estimates of a range of alternatives, were prepared in consideration of the proposal for restoring lake water levels. In particular, a design for a concrete weir across the Bigstone Cutoff of the Saskatchewan River at Cumberland House was prepared. All of these studies were completed during the fiscal year and the results will be examined to determine whether construction should proceed.

This new control structure located at the east end of Katepwa Lake on the Qu'Appelle River, is operated under the direction of the Qu'Appelle Operation Board which relies on the forecasting services of the Hydrology Branch, a part of Water Management Service.



Hydrology Branch

- conducts hydrologic investigations associated with basin planning studies and watershed development proposals;
- provides hydrologic service for provincial agencies;
- carries out reservoir and river system operation planning;
- provides a provincial streamflow forecasting service;
- collects basic hydrometric, meteorologic, snow survey, sedimentation and related data;
- maintains liaison with other departments and agencies to ensure co-ordination in operation and development planning;
- represents Saskatchewan and provides support in administering interjurisdictional water resources.

Special Activities

Committee on Hydrology

The director of the branch represents the province on the Prairie Provinces Water Board (PPWB) Committee on Hydrology, which provides advice and assistance to the board on all matters relating to surface water hydrology.

During the fiscal year, the committee held four meetings on a broad range of activities such as natural flow studies for Beaver River, Big Gully, Eyehill and Gainsborough Creeks, assessment of the impact of artificial drainage on downstream flows and the continuing review of the PPWB hydrometric station requirements. The report on procedures for interprovincial apportionment of the waters of Battle, Lodge and Middle Creeks was finalized. Also, a final draft report on interprovincial apportionment of westward flowing streams and a draft report on interprovincial apportionment of westward flowing tributaries of eastward flowing streams were prepared.

Flood Damage Reduction Program (FDRP)

Hydrology Branch involvement in the FDRP was significantly reduced due to expiration of the Canada-Saskatchewan Mapping and Studies Agreement early in the report year. Representation on the FDRP working group contributed to the direction and co-ordination of the technical work in co-operation with the Land Protection Branch. In addition, work continued on hydrology studies for the four urban communities in the Qu'Appelle Valley and for Kamsack. Hydraulic studies for flood hazard mapping were completed for Regina by year end.

Canada/USA Research Project

In 1979, the USA and Canadian national hydrological committees agreed that efforts and results of hydrological research activities, common to both countries, should be shared where possible. One such activity is the areal measurement of the water equivalent of the snowpack.

During the report year, the Hydrology Branch participated in the joint Canada/USA research project, conducted in southeastern Saskatchewan, by collecting snow and soil samples. The purpose of the project is to test various remote sensing techniques for measuring the snowpack water equivalent.

Intergovernmental Programs Division

This division is responsible for a range of field and office investigations associated with intergovernmental water activities.

During the report year, day-to-day input to the Canada-Saskatchewan flood damage reduction program continued but was reduced significantly with the expiration of the mapping and studies agreement.

The division head continued to serve as provincial co-manager of the Canada-Saskatchewan Interim Subsidiary Agreement on Water Develoment for Regional Economic Expansion and Drought Proofing. Work under the Canada-Saskatchewan Hydrometric Surveys Agreement was also co-ordinated for Saskatchewan by this divison.

Investigations Division

This division is responsible for conducting hydrologic investigations on various aspects of water resource development and management in Saskatchewan. The investigations include detailed hydrologic studies by basins or regions, hydrologic studies for licensing of community and private projects, safe building elevation studies, flood peak potential studies, environmental impact assessment studies and special studies. The division also supplies technical staff in support of the provincial hydrometric program and provides technical assistance to the operations division for spring runoff forecasting, snow surveys and water flow monitoring during the runoff period.

The division develops computerized programs to help improve work efficiency.

Detailed Hydrology Studies

This activity involves hydrologic assessment of major project proposals or river basins. Twenty-five major studies were undertaken during the fiscal year, including 15 studies carried over from the previous year. Work included the Frenchman River water supply study, studies in support of the flood damage reduction program at Kamsack, Lumsden, Craven, Fort Qu'Appelle and Tantallon, agricultural drainage impact studies on the Qu'Appelle River system and the study of the Qu'Appelle River conveyance impacts. Also, work was undertaken for the Flood Damage Reduction Program, the Drainage Control Program, the Qu'Appelle Implementation Program, the Saskatchewan Water Supply Board, the Conservation and Development Branch of Saskatchewan Agriculture, the Water Management Service and the Water Rights Branch of Saskatchewan Environment.

Hydrologic Project Studies

During the fiscal year, the division completed 40 hydrologic project studies of minor water development project proposals which include drainage projects under the drainage control program, flood control projects requested by Saskatchewan Agriculture's Conservation and Development Branch, proposed irrigation projects requested by the Water Rights Branch and subdivision requests from the Land Protection Branch. Requests were also received from Saskatchewan Tourism and Renewable Resources, the Prairie Provinces Water Board, the Flood Damage Reduction Program, Water Survey of Canada, Saskatchewan Agriculture and the Saskatchewan Power Corporation.

Water Supply Studies

Studies were completed on 91 small water supply project proposals. The majority of these requests were received from the Water Rights Branch. Requests were also received from Saskatchewan Agriculture's Conservation and Development Branch on two irrigation projects and Saskatchewan Tourism and Renewable Resources for a water supply study at a proposed lakeshore recreation area.

Safe Building Elevations Studies

The division reviewed 29 lakeshore subdivision proposals for the Land Protection Branch during the fiscal year. Proposed waterfront subdivisions were analyzed to determine their susceptibility to flooding.

Flood Peak Potential Studies

During the year, the division completed studies to determine the peak flow potential at 26 locations in the province. Requesting agencies were provided with estimated peak flows for a range of flood frequencies to use in the design of bridges, culverts and related structures. Requests for peak potential studies came primarily from Saskatchewan Rural Affairs, Saskatchewan Highways and Transportation, and the Land Protection Branch of Saskatchewan Environment.

Input to Environmental Impact Assessments

The division examined the hydrologic components of 26 different industrial developments and mining ventures. In most cases the work by the division involved hydrologic evaluations to determine the adequacy of statements made on surface water flows and related works. The results of the examinations were forwarded to the Environmental Assessment Secretariat.

Special Studies

The division handled 19 special studies during the report year. Studies were in the form of reviews of other agency reports, preparing answers to other agencies or private inquiries, compiling statistical information on water for other agencies and determining land ownership and control of shoreline properties.

Table 9 — Summary of Study Requests

Requesting Authority	Number of Requests
Saskatchewan Environment, Water Rights Branch	101
Saskatchewan Environment, Land Protection Branch	38
Saskatchewan Environment, Drainage Control Program	33
Saskatchewan Environment, Environmental Assessment Secretariat	26
Saskatchewan Highways and Transportation	12
Saskatchewan Agriculture, Conservation and Development Branch	12
Saskatchewan Rural Affairs	11
Saskatchewan Environment, Flood Damage Reduction Program	7
Saskatchewan Urban Affairs	5
Consultants	4
Prairie Provinces Water Board	3
Saskatchewan Tourism and Renewable Resources	3
Saskatchewan Environment, Qu'Appelle Implementation Branch	3

Hydrometric Network

Under the Canada-Saskatchewan Hydrometric Surveys Agreement, water level and streamflow data were collected at 373 hydrometric stations as listed in Table 10. The data provide a basis for the management and allocation of water resources in Saskatchewan and with neighboring provinces and states.

Provincial and federal stations are fully funded by the respective government and federal-provincial stations are cost-shared equally.

Provincial activities included field surveys, maintenance of stations and publishing of data at 43 lake level stations. Also, the province operates 15 hydrometric stations for special monitoring purposes that do not come under the agreement.

Table 10 — Canada-Saskatchewan Hydrometric Network, Breakdown of Responsibilities

Cost-sharing Responsibility	Streamflow	Lake Level	Total
Federal	100	39	139
Federal-provincial	116	10	126
Provincial	65	43	108
Total hydrometric stations	281	92	373

Computer Services

Utilization of computer facilities continued to expand. Staff relied heavily on the computer to aid in day-to-day work programs. Analyst support, which is centralized within the branch, was extended to the whole department on a limited basis.

During the report year, the computer section assisted in a department computer facilities study to evaluate existing and future requirements and to recommend workable solutions. Some areas of recent and planned future development are: expansion of in-house data storage, development of more efficient methods of data display such as computer graphics and computer output on microfiche, and improvement of techniques for acquiring real-time data.

Operations Division

The operations division provides a hydrologic service to the province in areas of streamflow forecasting and water resources project operation planning.

Streamflow forecasting is the development of forecasting procedures for critical locations to project future flow conditions.

Project operation planning is the maintenance of up-to-date information on control structure capabilities and lake or reservoir characteristics. This information combined with flow forecast information, enables the division to plan the operation of single or multiple-use reservoirs for the benefit of all users.

Streamflow Forecasting Service

Spring runoff forecasts for most of the major river systems in Saskatchewan were issued by the divison in early February to allow for flood control or water conservation measures to be implemented. These forecasts, based on recorded fall and winter precipitation as well as projected normal spring precipitation, were periodically updated and refined as the spring runoff period approached and as more current information and data became available.

In fall 1981, above normal precipitation in the Qu'Appelle, Souris, Wascana and Moose Jaw River basins and a heavy winter snowpack resulted in above normal peak flows in these basins in the spring of 1982. Division staff monitored runoff in the field and from the Regina office, and issued updated forecasts daily. These forecasts were issued to provincial and local Emergency Measures Organization officials, municipal officials and the general public. In spring 1982, flood damages in urban areas were minimized as flows were contained by permanent and temporary dykes and sand bagging, although flows in some locations were very high.

Table 11 — Magnitude of 1982 Spring Runoff in Selected River Basins

	1982 Recorded		Highest Recorded	
	Peak Flow	Ranking	Peak Flow	Year
Souris River at Estevan	85 m^3/s	8th highest	251 m^3/s	1979
Qu'Appelle River at Lumsden	210 m^3/s	2nd highest	436 m^3/s	1974
Moose Jaw River at Moose Jaw	154 m^3/s	4th highest	368 m^3/s	1974
Wascana Creek at Regina	63 m^3/s	3rd highest	102 m^3/s	1974

m^3/s — cubic metres per second.

Saskatchewan River System Operations

Flows into Lake Diefenbaker, which were about 50 per cent of normal in early 1982, resulted in a lake water level of 547.7 metres (m) (about 1.6 m below normal) on April 1. Normal inflows, combined with much below normal outflows in May, June and July, substantially increased the lake level to 555.94 m (0.4 m below normal) by August 1. From early June to early August, minimum releases of 45 cubic metres per second (m^3/s) provided for storage of water in Lake Diefenbaker. The peak inflow to Lake Diefenbaker occurred on July 11 at 890 m^3/s.

On the North Saskatchewan River at Prince Albert, the peak flow occurred on July 12 and 1 720 m^3/s. No spill was necessary from Tobin Lake during 1982 as the peak inflow was stored in the reservoir and releases continued through the turbines.

Qu'Appelle River System Operations

Operation of the Qu'Appelle River system is determined by the Qu'Appelle Operation Board. The board met three times during the year. Day-to-day operations were carried out by the division under guidelines established by the board to provide maximum benefit for all water users throughout the Qu'Appelle River system. Following the above normal spring runoff, all of the Qu'Appelle lakes receded to within their desirable operating ranges with the exception of Last Mountain Lake. For most of the summer, releases below Craven were restricted to the channel capacity in the Highway Number 6 to Pasqua Lake reach and Last Mountain Lake remained 0.5 metres above the desirable operating range. In September and October, releases were gradually increased from Last Mountain Lake and the downstream lakes to provide storge for the 1983 spring runoff. Some overbank flooding occurred in the Fairy Hill area when the Craven and Valeport control structures were opened. All of the Qu'Appelle lakes were at acceptable levels prior to 1983 runoff.

Boundary Reservoir Operations

Boundary Reservoir was operated during spring runoff to reduce flooding downstream while filling the reservoir. Peak flows on the Souris River at Highway Number 47 were reduced about 20 per cent as a result of the Boundary Reservoir operations and the reservoir was filled for the first time since 1979.

Cookson Reservoir Operations

The inflow to Cookson Reservoir was by far the highest since the reservoir was first filled. The spillway gates were opened completely to pass the peak inflow of about 100 cubic metres per second. The reservoir was full following the runoff and releases were made later in the year to meet international apportionment requirements.

Churchill River Operations

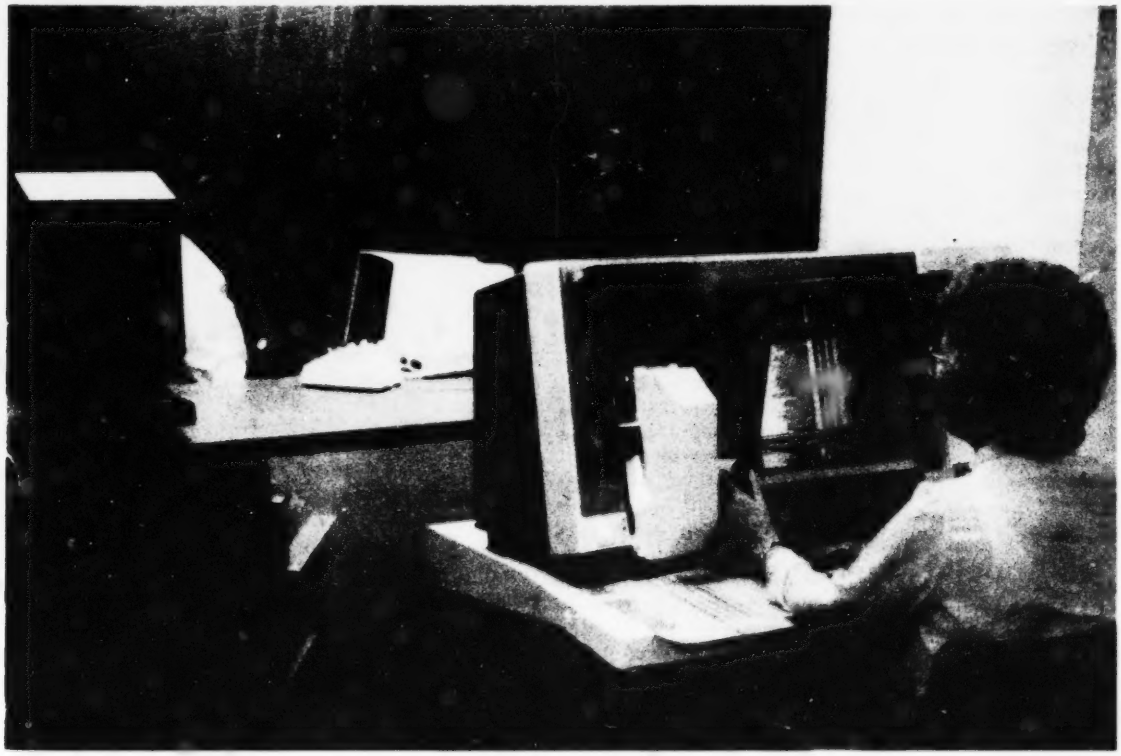
Streamflow in the Churchill River basin was below normal during the report year and Reindeer Lake, the major lake in the basin, remained at unusually low levels. Controls at the outlet from Reindeer Lake were closed during July and August but minimum flows to meet system needs for hydroelectric production were available through the year. The outlook for 1983-84 is for higher water levels on Reindeer Lake.

Sediment Studies

The division maintained its involvement in a joint research program with Environment Canada to monitor river regime changes on the South Saskatchewan River downstream of Gardiner Dam and the delta formation due to sedimentation in Lake Diefenbaker. Information from this program is used when dealing with problems and developments at this reservoir and along the river downstream.

No field surveys were conducted in 1982. Division involvement was limited to editing a draft report, being prepared by Environment Canada, that will compile the survey results from the mid-70s to present and will analyze the sedimentation in Lake Diefenbaker.

Readily available hydrometric data are the cornerstone of hydrological investigations. Computer tapes and micro-fiche are part of the working world in the Hydrology Branch.



Water Rights Branch

- administers and regulates the province's water resources by issuing licenses and permits for using and draining surface water, ground water and for hydro power generation;
- collects, compiles and provides information about surface and ground water resources;
- participates in regulating international and interprovincial streams;
- investigates and arbitrates problems and complaints arising from project operations, unauthorized drainage works and resultant flooding, flowing wells and drilling operations;
- assists in reviewing and approving wetland development proposals;
- provides support services to other branches of the department on environmental impact assessment, pollution concerns, Indian land-entitlements and industrial water charges;
- assists in interpreting legislation and procedures.

Surface Water Division

Surface Water Administration

Surface water administration activities for January 1, 1982 to December 31, 1982 are summarized in Table 12.

Surface water projects which required substantial administrative involvement by the division were: Humboldt, Eastend, Macrorie Water Users Association's irrigation project, Eston-Kindersley, Braddock and Cadillac Reservoirs, Ducks Unlimited's Middle Quill Lake, Ponass Lake and Neale-Edmunds projects, Saskatchewan Tourism and Renewable Resources—Valeport, and Eyebrow Lake (Nisku). Special attention was provided at Many Island Lake, Swift Current Creek, Frenchman River and Old Wives Lake basins.

Apportionment recommendations made by the Prairie Provinces Water Board s Committee on Interjurisdictional Agreements Administration for Battle and Lodge Creek basins were implemented.

Requests for special operations of reservoirs were made for Junction and Moosomin Reservoirs.

Vanguard and Val Marie were identified as water rights projects requiring investigation and studies.

Table 13 shows surface water projects authorized and licenced within the various drainage basins in the province.

Table 12 — Surface Water Project Administration Statistics

	1980	1981	1982
New project applications	311	316	302
Project construction authorized	188	309	235
New licences issued	146	202	120
Licences transferred	70	58	33
Licences cancelled (abandoned)	124	9	95
Temporary water use permits	24	40	15
Operational complaint inspections and investigations	51	47	36

Table 13 — Drainage Basins Showing All Authorized and Licenced Water Development Projects Under the Provisions of The Water Rights Act to December 31, 1982

Sub-basin Report / Drainage Basin		Number of Projects						
Number	Name	Domestic	Municipal	Industrial	Irrigation	Miscellaneous	Total number of projects	*Total storage
1	Lodge Creek	51	1	0	43	1	50	25 321.7
2	Battle Creek	223	0	1	233	6	463	11 565.3
3	Frenchman River	454	1	0	238	15	708	196 337.1
4	Many Island Lake	124	1	0	37	0	162	1 545.8
5	Bigstick Lake	189	0	0	115	6	310	7 459.1
6	Hay Lake	15	0	0	15	0	30	535.9
7	Crane Lake	64	0	0	79	3	146	11 995.7
8	Skull Creek	25	0	0	29	2	56	3 659.5
9	Antelope Lake	42	2	1	27	4	76	1 370.7
10	Swift Current Creek	169	2	4	328	12	515	125 530.7
11	Old Wives (Johnstone) Lake	1,175	11	4	670	31	1,891	79 539.2
12	McRae Creek	18	0	0	5	0	23	388.3
13	Woodpile Creek	14	0	0	2	0	16	196.5
14	Lyons Creek	50	0	0	10	1	61	1 745.8
15	Coteau Creek	51	0	0	11	0	62	320.0
16	Whitewater Creek	148	1	1	45	2	197	2 259.1
17	McEachern Creek	52	0	0	21	0	73	884.4
18	Horse Creek	4	0	0	1	0	5	28.6
19	Rock Creek	5	0	0	1	0	6	18.5
20	East Poplar	88	1	1	21	0	111	6 718.4
21	Poplar River	24	0	0	3	0	27	201.8
22	West Poplar River	3	0	0	2	1	5	1 210.5
23	Qu'Appelle River	732	44	21	396	79	1,272	91 164.9
24	Souris River	249	22	2	133	25	431	106 769.3
25	Manitou Lake	103	2	0	17	2	124	1 395.0
26	Lenore Lake Group	11	5	1	19	0	36	501.6
27	Quill Lakes	39	4	1	18	16	78	24 586.2
28	Carrot River	36	14	0	30	7	87	31 355.9
29	North Saskatchewan River	546	18	14	250	59	887	89 862.8
30	South Saskatchewan River	666	33	13	526	20	1,258	10 601 431.1
31	Assiniboine River	86	15	1	50	31	183	31 483.1
32	Swan Lake	2	0	0	4	0	6	288.8
33	Red Deer River (Saskatchewan)	16	9	2	9	13	49	80 450.8
34	Churchill River	8	4	1	7	7	27	12 721.0
35	Athabasca River	0	1	0	0	0	1	.0
36	Great Sandhills Group	123	1	0	62	6	192	8 364.6
37	Willowbunch Group	239	2	1	81	9	332	6 841.8
38	Rush Lake	179	1	0	124	1	305	19 485.5
39	Wildhorse Lake	5	0	0	2	0	7	58.6
40	Climax Group	83	1	0	60	1	145	1 321.5
41	Taits Lake	59	0	0	43	3	105	4 715.5

Table 13 — Drainage Basins Showing All Authorized and Licenced Water Development Projects Under the Provisions of The Water Rights Act to December 31, 1982 — (continued)

Sub-basin Report Drainage Basin Number	Name	Number of Projects: Domestic	Municipal	Industrial	Irrigation	Miscellaneous	Total number of projects	*Total storage
42	Bluff Creek	16	0	0	2	0	18	234.5
43	Coal Creek	2	0	0	2	0	4	13.7
44	Paisley Brook	51	0	0	3	0	54	453.2
45	Big Muddy Lake	119	0	0	28	5	152	4 318.6
46	Missouri Group	59	1	3	22	0	85	2 887.7
47	Little Manitou Lake	16	1	1	12	6	36	738.3
48	Shoe Lake Group	39	0	0	44	5	88	1 663.9
49	Green Lake	1	0	0	0	0	1	20.4
50	Lower Souris River Group	49	6	1	17	7	80	8 679.1
51	Unknown	19	2	1	16	8	46	14 775.6
53	Whitebear Lake	41	0	0	8	11	60	1 962.2
54	Coteau Group	16	0	0	1	4	21	722.3
55	Luck Lake	27	2	0	9	0	38	876.1
56	Goose Lake Group	82	2	1	40	6	131	2 853.7
57	Overflowing River	0	0	0	0	2	2	21 246.8
58	Kindersley Lake Group	101	3	1	32	19	156	15 167.3
59	Whiteshore Lake	26	0	1	11	0	38	325.8
60	Redberry Lake	13	0	0	2	3	18	4 048.1
61	Beaver River	2	1	1	5	35	44	80 380.8
64	Wollaston Lake	0	0	1	0	0	1	.0
67	Saskatchewan Lake	3	4	0	3	2	12	91.3
	Totals	6,852	218	80	4,024	476	11,650	11 753 090.0

* dam^3 — 1 000 cubic metres

International Streams

Under authority of the Boundary Waters Treaty of 1909, the International Joint Commission recommended that the daily natural flows of Battle Creek, Frenchman River, Lodge Creek and the Souris River be divided equally between Canada and the United States. Computations on the first three streams are carried out by federal officials at 10-day intervals during the open water season (March 1 to October 31 inclusive). On the Souris River, computations are carried out following spring runoff and at the end of the calendar year.

Table 14 shows international streams management between Canada and the United States during the 1982 calendar year.

Table 14 — International Streams Administration

	Battle Creek	Frenchman River	Lodge Creek	Souris River
Calculated flows at the US boundary (dam 3)	36 100	114 700	38 800	216 900
Comparison to normal flow (%)	110	133	107	168
US share (dam 3)	18 050	57 350	19 400	87 900
Delivered to US (dam 3)	21 900	82 500	22 400	122 900
Number of periods in deficit	4	3	2	0

dam3 — 1 000 cubic metres

Ground Water Division

Ground water resources are a significant component of the province's total water resources. Because of its widespread occurrence, constant quality and temperature, relative freedom from pollution and economical development cost, ground water is used by about 70 per cent of Saskatchewan farms and urban centres as well as industry for cooling and processing requirements. Over the past few years, there has been an increased interest by the agricultural sector in using ground water for irrigation. A major concern of this use is the long-range implications of increased soil salinity. Deeper sources of ground water provide reliable supplies of water during drought periods. Ground water contributes much of the base flow to the province's streams.

Over the settled part of the province, it is estimated that up to one billion cubic metres of water are added to the ground water system each year. Present annual pumpage of ground water for all purposes is estimated to be about 10 to 15 per cent of this addition.

Ground Water Administration

A total of 1,519 ground water projects are in good standing, 1,202 of which have been issued licences. There are 1,137 projects for municipal purposes and 346 projects for industrial purposes. Twenty-four ground water irrigation proposals were reviewed in 1982, a number of which proceeded to the ground water investigation stage.

The division also provided information on the location, development and testing of ground water supplies to all sectors of the public upon request. Total use of ground water in the province during the fiscal year is estimated at 340 000 cubic metres per day (75 million gallons per day).

Table 15 shows a summary of the ground water administration activities.

Project Investigation

Technical reviews, and in some cases site inspections, were provided to communities and individuals where required. Flowing well problems at Kelvington, Lang and Weirdale were investigated. Concerns over lowered ground water levels in 15 pumping centres were reviewed and assessed and aquifer protection concerns at Garrick and Tisdale were handled. A number of water well drilling complaints were also reviewed and dealt with.

Table 15 — Ground Water Project Administration Statistics

	1980-81	1981-82	1982-83
Licence applications received	96	113	90
Construction authorized	78	91	108
Licences issued	54	102	175
Licences cancelled	3	8	32
Investigation permits issued	116	123	61
Ground water probability reports (written and verbal)	253	250	200
Water well drilling machine registrations	147	141	147
Drilling Reports Received			
Test holes	1,317	1,895	930
Water wells	3,079	3,431	2,230
Total	4,396	5,326	3,160
Summary of Drilling by Purpose			
Domestic	4,160	4,969	2,808
Municipal	195	330	222
Industrial	33	5	25
Irrigation	8	22	3
Other	0	0	2

Geohydrological Services

During the report year, the division continued to provide the department, other provincial agencies and other organizations with technical and geohydrological services.

The division reviewed and assessed the geology and ground water components of project proposals, baseline studies, overviews, environmental impact statements, aquifer protection, hazardous material spills, and waste disposal at: PCS Brendenbury, Claude Lake uranium project, Cluff Lake uranium project, brine storage at Delisle, PCP containment at Glaslyn, Kinistino drainage project, Mulvena flood control project, Poplar River power generation station at Coronach, Co-op Refinery Regina, Regina waste management project, Regina rail relocation project, IPSCO Regina, Saskatoon landfill study, Queen Elizabeth power station at Saskatoon, aquifer protection at Tisdale, Wapiti Valley Regional Park, fertilizer storage project at Watson, and a proposed subdivision near White City.

Geohydrological Data Base

The division continued to collect, process onto a computerized record management system, and disseminate information on ground water resources. The geohydrological data base contains information on about 75,000 water wells and test holes. During the report year, the system was put on microfiche for selected distribution throughout the province to optimize usage of the information. Three statistical analysis computer programs were developed and used to prepare base geohydrological maps for the province.

Studies

An initial study of the geology and ground water potential of the Ravenscrag formation, extending over 20 000 square kilometres in southern Saskatchewan, was undertaken by contract. This aquifer system is a major source of water for rural users in this area.

The division contributed to the Interim Subsidiary Agreement on Water by reviewing and assessing the draft reports on ground water contractual studies for the Estevan Valley aquifer system, the Hatfield Valley aquifer system and the Judith River aquifer system in the southwest part of the province.

The division prepared and published a map series, extending over the settled part of the province, that shows the ground water levels throughout the area.

Work continued on a map series showing the anticipated yield of aquifers and a map series showing the location, depth and thickness of significant aquifers in the province. These mapping projects are part of a thrust to provide maximum information on ground water resources in a usable format to all sectors of the public.

Staff completed a preliminary review and assessment of the ground water supplies for several urban centres north of Saskatoon.

Other

Division staff completed an initial review of the use of ground water for irrigation purposes.

Staff assisted in the review and drafting of revised ground water legislation.

Staff represented the department on the Prairie Provinces Water Board's Committee on Ground Water and attended committee meetings in Edmonton and Regina.

Drainage Control Division

As a result of a heavy runoff in the southern part of the province in 1982 and the resubmission of many complaints unresolved prior to The Drainage Control Act being proclaimed, a high level of activity was maintained during the fiscal year.

An engineering technician was added to each of the Tisdale and Fort Qu'Appelle regional offices to aid in the investigation of complaints filed under The Drainage Control Act. This brings the total number of permanent positions in the division to nine.

A further expansion of staff and the establishment of two more regional offices are being planned for 1983-84.

Drainage Permits

Under The Drainage Control Act, permits are required by any person for the construction and use of drainage works. Table 16 summarizes the drainage applications and permits issued during the fiscal year.

Streamlining procedures and relaxing requirements for certain classes of works are being considered to speed up the issuance of permits for smaller drainage proposals.

Drainage proposals are evaluated to determine their possible effects downstream, the sufficiency of the outlet and other environmental concerns. Most proposals require local advertising to allow individuals to make their concerns known. The department held two public meetings during the report year.

Table 16 — Applications for Drainage Permits

	Incomplete Applications Received		Completed Applications Received		Permits Issued	
Applicant	**81-82**	**82-83**	**81-82**	**82-83**	**81-82**	**82-83**
Conservation and development areas	Nil	15	8	8	1	9
Individuals and unorganized groups	86	78	10	52	0	12
Totals	86	93	18	60	1	21

Complaints

The Drainage Control Act provides a mechanism to deal with drainage related problems through a complaint process.

Table 17 summarizes the number of complaints received and the status of those complaints at the end of the fiscal year. There were some 123 outstanding complaint investigations carried into 1983-84.

Saskatchewan Drainage Appeal Board

The five-member Saskatchewan Drainage Appeal Board was appointed in November. The chairman is Clayton Marshall of Somme. Other members are Robert Dorsch of Weyburn, Dr. Gerald Fuller of Regina, Paul Stankewich of Canora, and Rea Eagles of Macoun. The division provides administrative and secretarial support service to the appeal board.

The appeal board heard appeals against decisions, orders or actions taken on complaints and permit applications. Seven appeals were received during the report year; of these, four were heard and three were rendered.

Table 17 — Drainage Complaints

Complaints Received	1981-82	1982-83	Total
Total	128	187	315
Complaints withdrawn	Nil	31	31
Decisions rendered	Nil	42	42
Complaints under investigation			119
Complaints pending investigation			123

Wetlands

Staff of the division acted on the existing Technical Advisory Committee to consider agriculture-wildlife conflicts resultant from wetland area development. Committee activities included developing proposals to eliminate or mitigate these conflicts and making recommendations to the Wetlands Committee to approve or reject proposed developments.

During the year, ten new wetlands projects were submitted for review: Three were investigated and cleared, one was withdrawn during the review process and seven were still under review at year end. Since the beginning of the wetlands review process in October, 1971, 413 projects have been introduced into the system, 312 have been cleared, 49 withdrawn and 52 are still under investigation.

The Drainage Control Division provides secretarial services to the Technical Advisory Committee and the Parent Wetlands Committee. The Wetlands Technical Advisory Committee cleared 18 projects under the rural municipalities channel clearing policy during the fiscal year.

The Drainage Control Division issues permits for installation of sub-surface tile used for drainage.

Water Power Division

Legislative

In 1982, the regulations under The Water Power Act were amended to increase the annual water rentals for water power generation to be paid by licensees.

Hydroelectric Generation

The total power generated by hydroelectric projects in Saskatchewan during 1982 was more than 2.3 billion kilowatt hours. This was about 18 per cent less than the power generated in 1980 and was due mainly to reduced flows in the Saskatchewan River and Churchill River systems during the months of highest power demands.

Due to the decommissioning of Eldorado Nuclear's mine and mill, the Waterloo Lake generation station was not in operation following August, 1982.

Construction of Saskatchewan Power Corporation's Nipawin water power project continued in 1982.

Table 18 — Hydroelectric Power Generated

Year	Kilowatt Hours
1978	2 560 981 900
1979	2 426 223 500
1980	2 559 875 000
1981	2 907 544 700
1982	2 371 237 440
Five-year average	2 565 172 400

Table 19 — Hydroelectric Projects Operating in the 1982 Calendar Year

Name	Island Falls	Wellington Lake	Waterloo Lake	Squaw Rapids	Coteau Creek	Charlot River
Owner	Province of Saskatchewan	Eldorado Nuclear Limited	Eldorado Nuclear Limited	Saskatchewan Power Corporation	Saskatchewan Power Corporation	Eldorado Nuclear Limited
Water Source	Churchill River	Charlot River	Charlot River	Saskatchewan River	South Saskatchewan River	Charlot River
Capacity	125,000 hp	6,600 hp	10,000 hp	396,000 hp	252,000 hp	15,200 hp
Power Use	Flin Flon Mines Creighton	ENL Mine Uranium City	ENL Mine Uranium City	Saskatchewan Power Grid	Saskatchewan Power Grid	ENL Mine Uranium City
Power Generated in 1982 (megawatt hours)	604.2	33.0	14.9	1 021.6	663.2	34.4

Qu'Appelle Implementation Branch

- Initiates and co-ordinates development in the Qu'Appelle Valley under the direction of an eight-member, federal-provincial Qu'Appelle Valley Management Board, as set down in the Canada-Saskatchewan Qu'Appelle Agreement. Public consultation takes place through a 15-member public advisory council.

Implementation

The Qu'Appelle Implementation Office entered its eighth year of operation. The office was initially located in Fort Qu'Appelle to encourage regular communication between the implementation staff and residents of the valley. The implementation staff is made up of the director, an engineering coordinator, an administrative officer, an information officer and a stenographer.

Information

Several issues of the Qu'Appelle information newsletter covering a wide range of topics and a number of informational brochures were published. Regular progress reports were prepared to inform persons directly involved in implementation work, to assist in coordinating activities and to provide detailed information on the status of each project.

Environmental Improvement

There is continued public concern about the effect of water quality on recreation in the Qu'Appelle Valley. An improvement in water quality is essential for further development of the tourism industry.

During 1982-83, water quality monitoring was continued to more accurately define the nutrient loading into and out of the Fishing Lakes and the effects of constructed waste treatment facilities on water quality and trends in nutrient productivity in the lakes. As well, samples of water, sediment and biota were gathered at various locations along the Qu'Appelle River and analyzed for mercury and heavy metals.

The work is expected to provide useful information for better understanding the potential biological effect of these elements, tracing sources of pollution and indicating possible pollution abatement measures.

Municipal Waste Treatment

Construction of the Moose Jaw effluent irrigation system was completed and the first phase of the project was officially opened on June 25, 1982. Approximately 1,300 acres of private land was irrigated with eight centre pivots and a gated pipe system. Two additional pivot sprinklers will be used on city-owned land for disposal of excess waste water during the summer and fall.

The project will reduce the annual phosphorus contribution from the City of Moose Jaw into the Qu'Appelle system to less than one-half of the previous contribution. The remaining effluent will be disposed of in an infiltration pond or by expanding the irrigable area. A pilot infiltration pond was constructed and tests were conducted in the winter to determine the effectiveness of this method of disposal.

Construction of a two-cell sewage lagoon was completed immediately north of Katepwa Lake by the R.M. of Abernethy and the Village of Katepwa Beach. The lagoon will provide proper facilities for disposal of liquid wastes from the Katepwa Lake area. It has sufficient capacity so that the effluent will evaporate, thus eliminating the need for discharge of effluent to the Qu'Appelle River system.

The Village of Regina Beach completed preliminary plans for construction of a two-cell lagoon with disposal by spray irrigation on surrounding pasture land. The treatment facilities will include provision for disposal of the Village of Buena Vista's effluent. Plans have been made to construct the works with financial assistance under the Qu'Appelle Agreement.

Livestock Pollution

During 1982, works were constructed to control pollution from 36 livestock operations, bringing the total number of works constructed under the Agreement to 135. Construction was concentrated along the Moose Jaw River and Wascana Creek as well as the main stem of the Qu'Appelle River and major tributaries upstream of Pasqua Lake.

Inspections were completed on most of the livestock operations between Katepwa and Round Lakes to determine the potential pollution. Engineering surveys were carried out and plans were finalized for pollution control works, anticipating construction in 1983.

In compliance with The Pollution (By Livestock) Control Act, 1971, financial assistance of 100 per cent of the capital cost is provided to operators where operations existed prior to the act coming into effect.

Conveyance

The required right-of-way was obtained from private landowners for channel construction between Echo and Mission Lakes and negotiations continued for the acquisition of private lands required between Mission and Katepwa Lakes.

A contract was awarded for construction of channel improvements and a fish nursery pond between Echo and Mission Lakes.

The proposed interlake works are part of the over-all conveyance program to increase the capacity of the channel and to improve the lake outlets to provide increased flood protection, an assured water supply, stable lake levels and greater flexibility in operating the river system.

Moose Jaw Flood Protection

Two properties were acquired under a program to purchase seriously flooded properties along the Moose Jaw River in the River Park, Wellesley Park, Churchill Park and Kingsway Park residential areas.

Work on the removal of the mercury-contaminated sediments along Thunder Creek near its confluence with the Moose Jaw River was completed with the placement of topsoil and grassing of the disposal area in 1982. It is planned to make the land available to the Wakamow Authority for future use as a parkland.

Recreation and Tourism

Wildlife Management

Approximately 17 fish-and-wildlife projects have been completed to date. Some of the activities undertaken include: construction of fish spawning areas and rearing ponds; tree plantings for food and shelter to increase the upland bird population; construction of watering sites; cutting of browseways and small clearings; removal of tall dense shrub stands to stimulate regrowth and increase wildlife carrying capacity; rehabilitation of a trout stream and establishment of feeding stations for winter survival of white-tailed deer.

Tourism Facilities

During 1982, development work was completed on the Bird Point recreation area on Round Lake. A bath changehouse was constructed in 1981 and a boat launch, playground, parking lot and landscaping completed the development in 1982.

A 13-kilometre section of the resort road was constructed along the valley bottom west from Highway No. 9 in 1981. The remaining 20 kilometres to Tantallon was completed in 1982 to encourage tourist travel along this section of the Qu'Appelle Valley.

Incentives Program

Under the Qu'Appelle Agreement, loans and grants are available to encourage private commercial operators to locate in the valley and to expand or modernize existing facilities. Financial assistance, in the form of a non-repayable grant, is available for developments which provide new or improved accommodation, food services and recreation facilities.

During the past year, construction was completed on the Phase 1 expansion and renovation of the Country Squire Motor Hotel in Fort Qu'Appelle and the new hotel at Regina Beach, with grants provided under the Qu'Appelle Agreement.

Community Development Assistance

The Village of Tantallon prepared a concept plan in 1981 for a recreation area near the village. The development was completed in 1982 and includes campsites, toilet facilities, water service, a trailer sewage disposal station, grading and gravelling of internal roads and a parking lot. Financial assistance is provided under the agreement to selected valley communities to assist with tourist development.

Environmental Assessment Secretariat

R. L. Kellow
Executive Director

Environmental Assessment Secretariat

- screens development proposals to determine need for environmental impact studies;
- develops guidelines for impact studies and reviews submitted environmental impact statements;
- co-ordinates government participation in the impact assessment and review process;
- co-ordinates public participation in the impact assessment review process;
- monitors approved projects to ensure compliance with presented mitigative measures and maintains contact with regulatory agencies involved.

Guideline Development

During the 1982-83 fiscal year, the Secretariat developed guidelines for environmental protection during mineral exploration in northern Saskatchewan. These guidelines advise on environmental protection measures and serve to increase the general environmental awareness of exploration personnel and decrease the adverse effects of mineral exploration in northern Saskatchewan.

A second set of guidelines pertaining to development and reclamation of sand and gravel pits was near completion by year end. It is expected that these guidelines will be completed during the 1983-84 fiscal year.

Impact Assessments

During the fiscal year, 46 new project proposals were received by the secretariat. The status of the various project proposals received or under review during the year is as follows:

Table 20 — Projects Requiring an Impact Assessment or Undergoing Screening at Year End

Proponent	Project
Amok Ltd.	Claude Ore Body Uranium Mining Expansion
Canadian Occidental Petroleum Ltd.	Uranium Mining (McLean Lake Uranium Development)
City of Regina	Relocation of CN Mainline and Marshalling Yards
City of Regina	Waste Management Study
Esso Minerals Canada Ltd.	Uranium Mine and Mill at McMahon Lakes (Midwest Lakes Project)
Northern Saskatchewan — Project Management	Road from Highway 105 to Stony Rapids
Potash Corporation of Saskatchewan	New Potash Mine, Bredenbury Area
Rural Municipality of Hoodoo	Proposed Weir — Wakaw Lake
Saskatchewan Highways and Transportation	Relocation of Hanson Lake Road (Highway 106) in Big Sandy Area
Saskatchewan Highways and Transportation	Highway 55 — Green Lake
Saskatchewan Highways and Transportation	Highway 8 — Qu'Appelle Valley
Saskatchewan Highways and Transportation	Borden Bridge
Saskatchewan Mining Development Corporation	Uranium Mining (Dawn Lake)
Saskatchewan Power Corporation	Transmission Line — Codette to Beatty
SERU Nucléaire (Canada) Ltd.	Uranium Mining (Waterbury Lake)

Table 21 — Projects Screened — Impact Assessment Not Required

Proponent	Project
Aquedeo Beach Resort	Marine Construction
Arlington Beach Camp	Camp Expansion
Canadian Seed Coaters Ltd.	Processing Plant
Chester Conservation Area Authority	Candiac Flood Control Project
City of Lloydminster	East Storm Discharge Channel
Ducks Unlimited	Neal Lake Project — Development Project for Waterfowl
Ducks Unlimited	Wellington Marshes — Development Project for Waterfowl
Ducks Unlimited	Baglole Project — Development Project for Waterfowl
Ducks Unlimited	Ponass Marsh — Development Project for Waterfowl
Ducks Unlimited	Labatte Lake — Development Project for Waterfowl
Ducks Unlimited	Black Lake — Development Project for Waterfowl
Ducks Unlimited	Horseneck Lake — Development Project for Waterfowl
Ducks Unlimited	Ross Lake System — Development Project for Waterfowl
Ducks Unlimited	Hanson Lake Project — Development Project for Waterfowl
Ducks Unlimited	Pathlow North Project — Development Project for Waterfowl
Ducks Unlimited	Krywy Project — Development Project for Waterfowl
Ducks Unlimited	Pathlow South — Development Project for Waterfowl
Ducks Unlimited	Norona Lake — Development Project for Waterfowl
Ducks Unlimited	Evan Lake — Development Project for Waterfowl
Ducks Unlimited	MacDonald Lake — Development Project for Waterfowl
Ducks Unlimited	Merle Project — Development Project for Waterfowl
Frank Bond	Dry Bulk Fertilizer Plant — Choiceland
Hanson Inc./Threadfast Ltd.	Electroplating Plant, Swift Current
Hunter Creek Conservation Area Authority	Waterloo-Hunter Creek and Attica Flood Control Project
Northern Saskatchewan	Deschambault Lake Road
Prince Albert Pulpwood Ltd.	Hague Creek Improved Bush Road
Rural Municipality of Craik	Municipal Airport
Rural Municipality of Pense	Resort Road Construction
Saskatchewan Economic Development Corporation	Agriplace Land Development — Saskatoon
Saskatchewan Highways and Transportation	Highway 13 — Hazenmore to Cadillac
Saskatchewan Highways and Transportation	Reconstruction of Highway 9 — Souris River Crossing
Saskatchewan Highways and Transportation	Upgrading of Highway 224
Saskatchewan Power Corporation	Transmission Line — Missinipe to Grandmother's Bay
Saskatchewan Power Corporation	Transmission Line — Coteau Creek to Swift Current
Saskatchewan Power Corporation	Rural Gasification
Saskatchewan Power Corporation	Transmission Line — Glaslyn to Meadow Lake
Saskatchewan Rural Affairs	Tramping Lake Causeway
Saskatchewan Tourism and Renewable Resources	Proposed Powerline to West Block (Cypress Hills)
Saskatchewan Tourism and Renewable Resources	Resource Road — Candle Lake Bypass
Saskatchewan Tourism and Renewable Resources	Cypress Hills — Upgrading of Sewage Treatment and Disposal System
SERU Nucléaire (Canada) Ltd.	Waterbury Lake — Local Access Road
St. Peter Conservation Area Authority	Range Slough Flood Control Project
Sunshine Developments Ltd.	White City Industrial Park
Village of Ceylon	Water Supply Project
Wakamow Valley Authority	Plaxton's Lake Dredging Project
Wapiti Valley Ski Association	Wapiti Park Development

Table 22 — Assessment Process Completed and Projects Approved

Proponent	Project
Amok Ltd.	Claude Lake Experimental Pit — Uranium Development
Eldor Mines Ltd.	Expansion of Uranium Mine, Collins Bay, Wollaston Lake
Saskatchewan Highways and Transportation	Highway 41 — Wakaw to Melfort

Table 23 — Projects Deferred or Cancelled

Proponent	Project
Cayo Developments Ltd.	Hidden Valley Resort
City of Melfort	Eagle Lake Project
Eldorado Nuclear Limited	Ena Lake Water Transfer
Energy Reserves Canada Ltd.	Upper Waddy Lake Gold Development
Husky Oil Operations Ltd.	Heavy Oil Upgrader
Kenergy Resource Corporation	Gold Mining — North Saskatchewan River
Northern Saskatchewan — Project Management	Cumberland Lake Water Level Control
Northern Saskatchewan — Project Management	Cumberland House — Amisk Lake Road
Peter Miller	Placer Gold Mining
Saskatchewan Highways and Transportation	Fir River Road
Saskatchewan Highways and Transportation	Highway 41 — Melfort Routing
Saskatchewan Power Corporation	Northern Grid
Saskatchewan Power Corporation	Courval Thermal Plant
Saskatchewan Power Corporation	Diefenbaker Lake Thermal Plant
Saskatchewan Power Corporation	Lignite Mining Project
Saskatchewan Power Corporation	Coal Transportation Alternatives
Saskatchewan Power Corporation	Western Grid
Saskatchewan Tourism and Renewable Resources	Cypress Hills — Resort Development
Saskatoon Chemicals	Sodium Chlorate Plant Expansion II
SERU Nucléaire (Canada) Ltd.	Conversion of Winter Road to All-Weather Road
Valley Estates	Snoasis Valley Development

Policy Planning and Research Branch

H. S. Maliepaard, Director

Policy Planning and Research Branch

- develops and co-ordinates environmental planning and research programs;
- develops policy guidelines for resource development and management.

Mackenzie River Basin Task Force

The Mackenzie River Basin Study report was released in February by the governments of Canada, Saskatchewan, Alberta and British Columbia. The report contained baseline data on water and related resources in the Mackenzie River basin and nine recommendations that suggested ways of managing water flows in the basin. The task force met five times during the fiscal year to develop an implementation strategy for administering the recommendations.

Cold Lake/Beaver River Study

This study was initiated by Alberta Environment to examine and recommend alternative water management strategies for the Beaver River watershed in the event that bitumen extraction plants are built west of Cold Lake. Because downstream effects of oil developments could affect Saskatchewan, Alberta Environment requested that Saskatchewan Environment participate as an observer on the committee overseeing the study. Public meetings held in Bonnyville, Alberta in February, were attended by local Saskatchewan residents as well as representatives from the Saskatchewan Government. Alberta Environment prepared an interim planning report recommending a short-term management plan which would use local water supplies without control structures. The study, expected to continue for several years, will examine remaining uncertainties and develop a long-term management plan.

Ecological Reserves

During the summer, one natural area was investigated in detail and eight other areas surveyed briefly to determine their ecological reserve potential. Reports on nine previously investigated natural areas were completed. Discussions were held on administration of The Ecological Reserves Act and possible ecological reserves which may be established in the future.

Greese River in the McKenzie River basin. Photo by Henry Epp

Administration Branch

R. P. Knoll, Director

Administration Branch

- provides department support services for accounting, purchasing, stenographic, filing, mailing, library, drafting, personnel, training, systems and computer operations;
- maintains operations for the minister, deputy minister, and two executive directors;
- provides management advisory services to branches;
- co-ordinates preparation of budget and legislation for the department;
- collects all department revenues under federal-provincial agreements, licence fees and water use charges.

Accounting and Purchasing

This section was responsible for all accounting procedures for the department. This included processing all expenditures, payrolls, purchase of materials and supplies, processing of travel and sustenance claims, budgeting and inventory control, collection of revenue, and maintenance of all departmental accounting records and statements.

Steno Services

This section provided stenographic and receptionist services to all employees in the department. The services provided include the operation of a word processor for production of many of the larger reports and repetitive documents.

Records, Postal and Library Services

This section provided centralized filing, mail and library functions for the department.

Staff received and delivered incoming mail, processed outgoing mail, operated a small blueprinting machine, maintained the department's centralized records system, and co-ordinated the microfilming program for the department.

The library subscribed to periodicals and purchased books, reports and pamphlets for the department. The library also obtained inter-library loans, and co-ordinated department staff requests using the provincial library computer search program. Approximately 300 acquisitions were processed and 250 inter-library loans arranged.

Drafting and Graphic Services

This section provided drafting and graphic requirements for the department.

Over 60 drainage survey plans were drafted, with revisions completed to 53 existing drainage plans. In addition, approximately 700 surface water rights plans were amended.

Drafting was completed for 11 hydrology studies. Material was required for hydrological meetings and reports throughout the year.

Over 120 visuals were prepared for public presentations. Graphics were also required for several report and brochure covers. In addition, an estimated 225 illustrations to complement a department manual were prepared.

A series of two-colour potentiometric surface maps were prepared for the Water Rights Branch.

Personnel and Training

The department filled 11 permanent positions during the year. In addition, 64 temporary, casual and part-time appointments were made; many were students hired for the summer months under the University of Regina, Student Co-op Program.

Systems Services

This section was responsible for co-ordinating computer systems in the department and conducting systems studies to improve effectiveness and efficiency of department operations. The Systems Centre completed an evaluation of the department's word processing requirements. They were also contracted to conduct an evaluation of the department's data processing facilities.

Table 24 — Statement of Expenditures and Revenues for the Fiscal Year Ending March 31, 1983

Saskatchewan Environment's operations are financed out of general revenues of the province in accordance with a budget approved by the legislature. Spending for the fiscal year ending March 31, 1983 was as follows:

Expenditures

Administration Branch	$1,262,321
Public Information and Education Branch	402,019
Policy, Planning and Research Branch	355,285
Air Pollution Control Branch	300,375
Water Pollution Control Branch	920,060
Land Protection Branch	844,025
Mines Pollution Control Branch	587,535
Mines Waste Research Secretariat	133,160
Environmental Assessment Secretariat	360,755
Hydrology Branch	2,233,653
Water Rights Branch	949,913
Qu'Appelle Implementation Branch	596,723
Treaty Indian Land Entitlements	37,460
Grants to Organizations for the Purpose of Advising the Minister of Environment on Environmental Concerns	145,443
Total	$9,128,727

Saskatchewan Environment collects licence and permit fees under The Water Rights Act, The Ground Water Conservation Act and The Drainage Control Act; collects charges for water use under The Water Resources Managment Act and collects rentals for water use under The Water Power Act. It also receives revenues from other governments for work done or services provided under intergovernmental agreements.

These revenues are turned over to Saskatchewan Finance by the department.

Revenues

The Water Rights Act — fees	$ 6,210
The Ground Water Conservation Act — fees	4,395
The Drainage Control Act — fees	4,155
The Water Resources Management Act — water charges	133,180
The Water Power Act — rentals	986,269
Other Governments — Canada	575,761
Total	$1,709,970

Public Information and Education Branch

C. H. Olson, Acting Director

Public Information and Education Branch

- replies to inquiries and provides information about the policies, programs and activities of the department;
- fosters public involvement in environmental assessments, public inquiries and environmental policy making and protection projects;
- co-operates with educational institutions and agencies in the development and administration of environmental education programs.

Information Division

News Releases

During the fiscal year, 24 news releases were prepared by division staff for distribution to the media. Efforts were made to keep the public informed on the cleanup of major spills of hazardous substances, major environmental impact assessments and water supply and quality problems.

Advertising and Public Announcements

Radio and newspaper advertising were used to inform the public of proposed developments and to encourage participation in public reviews of environmental impact assessments.

Public reviews were held for Cluff Mining's uranium mines expansion, Cluff's Mining's experimental uranium ore pit and Eldor Mines Limited's uranium mine and mill operation. Public announcements were issued on the City of Regina's proposed relocation of the CN Railway yards and adjoining rail lines and the Regina landfill site.

Advertising was also developed for public involvement programs held during the fiscal year.

Publications

Several existing publications were revised during the fiscal year. An air pollution pamphlet was developed on motor vehicle emissions. Division staff continued to have reports and information materials published for other branches in the department.

Inquiries

Staff answered more than 300 inquiries for general information on the environment. In addition, a contact person was established in the branch to handle public inquiries during the Cabinet Committee on Water Concerns public hearings.

Audio-Visual Presentation

By year end, work was almost completed on a slide-tape presentation which highlighted the roles of the various branches within the department. The presentation will be used at trade fairs, exhibitions and other public events to promote an increased awareness of departmental functions.

Public Involvement

Pitch-In '82

Approximately 1675 cleanup projects were conducted by Saskatchewan groups and organizations during the department sponsored anti-litter week, May 10-16. This was a 20 per cent increase over 1981.

Program information kits were distributed to schools, municipalities, native groups, industry, girl guides, boy scouts and community organizations throughout the province inviting them to organize cleanup programs during Pitch-In '82 Week. To assist with cleanup activities, the department donated 90,000 plastic litter bags, an increase of 15,000 over 1981. A certificate of appreciation was sent to each participating group.

Pitch-In has been held annually since 1975 in co-operation with Outdoors Unlittered, a non-profit western Canada anti-litter organization.

An evaluation of the anti-litter programs was conducted during the summer. A decision was made to develop a similar, department-administered campaign to be piloted in June 1983. The objectives of the new campaign were to encourage increased public participation in the anti-litter program and an increased awareness towards litter and litter prevention as well as to provide a new program image that could be readily identified with Saskatchewan.

Conservacheck — Safety Lane '82

Saskatchewan Environment, with assistance from Environment Canada, participated in Conservacheck — Safety Lane '82, a program sponsored by the Highway Traffic Board and Saskatchewan Mineral Resources, Energy Conservation Branch. The lane provided a free safety and energy conservation check to motor vehicle drivers.

Branch staff co-ordinated publicity materials such as news releases and advertisements with the other government departments and developed a pamphlet and car bumper sticker for distribution at the safety lanes. The branch also supplied car litter bags to contain all information material distributed at the 28 Conservacheck locations.

Conservacheck was held throughout Saskatchewan during July, August and early September.

Hazardous Waste Managment Symposium

A major symposium on hazardous waste management in Saskatchewan was held April 14 and 15, in Saskatoon. Branch staff organized the symposium which was co-sponsored by Saskatchewan Environment, the Saskatchewan Urban Municipalities Association and the Saskatchewan Association of Rural Municipalities.

The objectives of the symposium were to provide an opportunity for interested groups to become aware of various aspects of hazardous waste management and to propose measures for managing hazardous wastes in the future.

About 100 delegates from industry, transportation and research organizations, local and provincial government agencies and environmental and special interest groups attended the symposium.

Speakers came from Alberta and Ontario to share their respective experiences in developing a hazardous waste system. Presentations included an overview of the hazardous waste management problem in other countries and other provinces, and options for Saskatchewan. Three workshops focussed on:

- transportation of hazardous materials;
- siting hazardous waste treatment and disposal facilities;
- the roles of industry and government in a hazardous waste management program.

A final plenary session dealt with workshop proposals.

Education Division

Environmental Discovery Program

The environmental discovery program, introduced to Saskatchewan in 1981, operated again during the summer. Two biology students from the University of Saskatchewan visited schools, summer camps and provincial parks from May to September conducting workshops for teachers, students, camp leaders and campers throughout Saskatchewan.

The main objective of the program was to stimulate environmental awareness in a fun-like atmosphere. The program also provided teachers and camp leaders with organizational tips and program ideas for working with children outdoors.

The seven activities and studies used in the program were soil, field/forest, insects, aquatic habitat, environmental games, fallen log post mortem and mini beast safari. Several requests for modified programs were also accommodated.

During the months of May and June the emphasis was on school visitations throughout the province. The environmental discovery team spent one week in each of the seven education regions. During July and August the team visited summer camps and provincial parks.

Bookings were handled on a first-come, first-serve basis with preference given to requests from schools outside the major urban centres of Regina and Saskatoon where outdoor and environmental education programs already exist. Participants and organizers rated the program as excellent. An estimated 4,150 people participated in the program in just under four months.

SNOOP

SNOOP greeted Saskatchewan primary students for the third year when they returned to school in September. This fictitious character was featured in a monthly series of environmental education materials mailed to elementary schools during the school year. The program was designed to familiarize children with all aspects of the environment in which they live, increase their concern for nature and sharpen their skills of inquiry.

The number of teachers using the SNOOP program increased from 2,400 in 1980-81 to 3,500 in 1981-82 and to 4,500 in 1982-83. Each issue includes a large wall calendar, a teacher's guide and a set of six activity sheets which can be duplicated for students.

Northern Landscapes

Production of a second teaching resource kit, Landscapes: A Guide to the Landforms and Ecology of Northern Saskatchewan, was initiated in 1981-82. Work on the kit continued throughout 1982-83. The northern kit will follow the same format as its southern predecessor. It will include a reference manual to be written by Dr. J. S. Rowe of the University of Saskatchewan; six slide/tape presentations describing typical terrain categories of northern Saskatchewan; six field guides to accompany the slide presentations and a wall map of Saskatchewan to show the main terrain categories and their sub-categories between 50° and 60° latitude.

The projected publication date is September, 1984.

Man and the Environment

This is a series of 20 supplements to the "Man and the Environment" theme found in the Division III Science curriculum guide for grade seven. This series, published jointly by Saskatchewan Environment and Saskatchewan Education, is based on materials collected and organized by Max Abraham of the Saskatoon Board of Education. The components include a teacher's guide and a student activity master for duplication. Saskatchewan schools received copies of the material in September.

Environmental Advisory Council

Under the terms of the Department of the Environment Act, the minister of the environment appointed a 12-member citizen committee to advise him on environmental issues. The head of the education division served as the department liaison to the council.

One council meeting was held at Carlyle in June and two council members and the department liaison attended the seventh joint meeting of federal-provincial Environmental Advisory Councils in Nova Scotia. In addition to reports on the sessions, delegates commented on the wide differences in structure and functions of individual councils across Canada.

The minister introduced a review of the council in July and council activities were halted October 31, 1982. The review is expected to be completed in the 1983-84 fiscal year and a decision on a format for council will be made at that time.

Thank You

Our appreciation to many Saskatchewan citizens, employees of provincial, federal and municipal government agencies inside and outside Saskatchewan and those officers and members of associations who have helped us with our work during the year.